THE BOOK OF THE FAIR

COLUMBIAN EXPOSITION

1893

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THE

BOOK OF THE FAIR

AN

HISTORICAL AND DESCRIPTIVE

PRESENTATION OF THE

World's Science, Art, and Industry, as Viewed through the Columbian Exposition at Chicago in 1893

Designed to set forth the Display made by the Congress of Nations, of Human Achievement in Material Form, so as the more Effectually to Illustrate the Progress of Mankind in all the Departments of Civilized Life

BY

HUBERT HOWE BANCROFT

Volume Two.



CHICAGO AND SAN FRANCISCO

THE BANCROFT COMPANY, PUBLISHERS

1895

THE HISTORICAL WORKS OF HUBERT HOWE BANCROFT

UNIFORM LIBRARY EDITION

Cloth 8vo. per vol. $4.50; Sheep, $5.50; Half Morocco, $8; Full Morocco, $10

Native Races of the Pacific States, 5 vols.
History of Central America, 3 vols.
History of Mexico, 6 vols.
History of Texas and the North Mexican States, 2 vols.
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California Inter Pocula, 1 vol.
Essays and Miscellany, 1 vol.
Literary Industries, 1 vol.

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CHAPTER THE THIRTEENTH

AGRICULTURE

THE Agricultural building is among the most sightly of the Exposition palaces, its chaste and serious design, its wealth of decorations, and richness and variety of detail, making it one of the most refined and luxurious homes of industry that welcome this gathering of the nations. Fronting on the main court 800 feet, with a depth of 500, and with its eastern façade almost touching the waters of the lake, this structure occupies, apart from its annexes, a space of some nine and a half acres. Built with a careful regard to its effect on adjacent edifices, it was planned in such fashion as to secure the best disposition of its contents, together with the lighting needed for a comparison of the agricultural products of our own and foreign lands, between many of which their delicate shades of distinction cannot be readily detected.



ABUNDANCE. MARTINY



SIGN OF THE ZODIAC

After considering their plan, the New York firm of architects by whom was designed this temple of Ceres, decided to erect their main building around a hollow square, divided in the centre by two open naves intersecting at right angles, and on their sides two-storied aisles, with longitudinal passage-ways through the four courts into which the floor is thus divided. Passing between the Corinthian pillars at the principal entrance, more than 60 feet wide, the visitor enters a vestibule profusely adorned with statuary emblematical of agriculture and agricultural pursuits, the vestibule leading into a rotunda, 100 feet in diameter, and surmounted by a glass dome 130 feet in height. At the top of the building and around it is an arcade, and at the corner are pavilions, also with domical treatment. The edifice is fashioned after the style of the classic renaissance; portions of its walls are painted with allegorical figures, and on the outer sides, as well as in the interior is a luxury of pictorial, sculptural, and other artistic ornaments, relieving the stateliness of the design.

While none but the most captious among the pilgrims of the Fair will be disposed to find fault with this structure, in itself a well-nigh perfect work of art, it has been objected, and not without reason, that nearly one half of the space was devoted to aisles and other passage-ways. To the distribution of that space exception has also been taken; but by the artificers and managers these apparent defects are explained through considerations that need not here be mentioned. To Great Britain were allotted more than 13,000 feet, and to France, a greater agricultural country, only 7,000 feet. Australia has 8,600 feet, while to such great agricultural states as Kansas and California, both with a much larger volume and variety of agricultural production, only some 2,000 feet were awarded. Russia has 9,500 feet, and Italy and Spain but 3,000 or 3,500 feet for each; but in all cases the allotment of space has been regulated rather by the character and extent of the display than by the agricultural output of the territorial divisions here represented.

Adjoining the Agricultural building is a large annex, near one of the stations of the elevated railway, and of which a portion is used as an assembly hall, and as a common meeting ground for persons engaged or interested in agricultural and stock-raising industries. On the ground floor is a bureau of information, where



AGRICULTURAL BUILDING

are attendants whose duty it is to give to visitors such knowledge as they may desire, not only concerning the hall and its purposes, but as to the main building and its contents, with other portions of the Exposition. Here and on the second floor are waiting-rooms and apartments suitable for committees and associations, whose secretaries are always at hand.

In none of the homes of the Fair has sculptural and pictorial embellishment been more happily blended with architectural design. Above the gilded dome is poised St Gauden's gilded statue of Diana, appearing to better advantage as thus transferred to its lofty pedestal from the Madison Square garden in New York. Over the corner pavilions are Martiny's figures of the races, in four groups of colossal female forms, supporting mammoth globes. All are identical in pose, and it is said, produced from a single mould, a different head being placed on each of the models. On the pediments of these pavilions are groups by the same artist, representing a shepherdess with her flock, and a shepherd with his dogs, all in his happiest style. Other of his contributions are those which portray, in classic symbolism, the signs of the zodiac and the emblems of abundance, the fluted drapery of the latter concealing their opulence of form, some holding under their wings the horns of



THE FOUR RACES

plenty, and others with tablets on which are inscribed the names of products emblematic of the seasons. Still another of his groups is typical of agriculture, the tall impersonation of that industry rising above the branching horns of oxen, yet in perfect symmetry and poise. Over the principal entrance is a statue of Ceres, by the Florentine artist Larkin J. Mead, who parted with his treasure somewhat reluctantly, and only because, as he remarked, it would reveal to our American artists what sculpture really is.





SECTIONS OF AGRICULTURAL BUILDING

Let us hope that his brethren of the craft have laid the lesson to heart.

The decorations in graphic art are by George W. Maynard, of New York. At one side of the main entrance Cybele is seated in her chariot, drawn by lions, and on the opposite side, in a car to which winged dragons are yoked, is King Triptolemus, sent forth by the mother of the gods to instruct all the nations of earth in the science of agriculture. Between them are allegorical figures set in a framework of grain and fruit. At the corner pavilions are figures emblematic of the seasons, and on the friezes above, those of domesticated animals.

In the department of agriculture are included not only the fruits of the soil in the shape of food and forage plants, but all the articles manufactured from those products, whether in solid or liquid form. Thus in one group we find bread and biscuits, starches and pastes; in another, sugars and syrups; in a third, malt and



PANEL, AUTUMN, MAYNARD



GROUP BY MARTINY

Chicago is the main centre of distribution, and supply, the Exposition has no more attractive features than its Agricultural and Live-stock departments, the latter presently to be described. Of the entire grain receipts of that city, valued for 1892 at about $150,000,000, from eighty to ninety per cent is shipped to domestic and foreign markets, where also is forwarded either on hoof or as meats and lard, as hides and wool, the bulk of its live-stock consignments, representing for the same year a valuation of more than $250,000,000. The region tributary to Chicago, including, as it does, a wide section of the western and middle states, is largely devoted to agriculture and stock raising, furnishing indeed a very considerable proportion of the food supply of the world.

In all the United States there are probably not less than 10,000,000 persons engaged in various branches of agriculture, while each one so engaged supports on an average at least two other persons. Thus it will be seen that nearly one half the population of the republic is directly dependent on agriculture for a livelihood, the alcoholic liquors, wines being represented in the Horticultural division. Here also are meats, smoked, salted, canned, or as extracts, and in a separate structure, the products of the dairy. Agricultural machinery, implements, and processes are fully represented, with fertilizing substances, both animal and mineral. There are farm buildings, models, methods, plans, and statistics, and classed in this division, though housed elsewhere are exhibits of Forestry, and all that the forest supplies.

To the residents of the several states of which



PANEL, CYBELE, MAYNARD

number actually employed far exceeding those engaged in all other fields of labor. Add to this the part that agriculture plays in our commerce, our manufacturing, shipping, railroad, and other interests, and it probably surpasses in economic, if not in money value, all other productive industries combined. While in some directions, and especially in cereals, over-production has been followed by a heavy decline in prices, leaving but the smallest margin of profit, and in unfavorable years a positive loss, the more intelligent farmers have fully held their own, many of them raising a variety of products, and with special regard to present and prospective demand.



SYMBOLICAL GROUP

In no country in the world are there so many farms of considerable size held and worked by individual owners. If in France, Belgium, and a few other countries, there is, in proportion to population, a larger number of proprietary farmers, the average of their holdings is by comparison almost infinitesimal. Of the 600,000 or 700,000 Belgian farms, for instance, nearly one-half do not exceed ten acres; many have less than five acres, and instances are not rare where a family is supported on a single acre. Of the 5,000,000 farms under cultivation in the United States, at least 3,500,000 are worked by their owners in holdings of from 50 to 500 acres, and of farmers with more than 500 acres there are more than of those with ten-acre patches or less. Of tenant farmers there are about 500,000 who pay a money rental, and perhaps twice that number whose rent consists of a certain portion of their crops.

Of the entire area of the United States, less than one-half is included in its farms, and less than one-third is under actual cultivation, the remaining half still containing fertile tracts, though most of it consists of grazing lands, of water surfaces, of mountain ranges, and of the desert lands west of the Rocky mountains. Meanwhile the more valuable portions of these lands are being absorbed under the provisions of the homestead and timber acts, located with scrip and warrants, or selected by railroads, at the rate of 15,000,000 to 20,000,000 acres a year. In other words, a territory almost as large as that of New England, excluding the single state of Massachusetts, is being segregated every twelvemonth from that which is left of the national domain.



QUADRIGA ON PERISTYLE

During the five years ending with 1892, the United States produced an average crop of more than 3,000,000,000 bushels of cereals, maize ranking first as to volume and value of production, and next, in the order named, oats, wheat, barley, rye, and buckwheat. In 1892 the acreage under cultivation was somewhat smaller than in 1888, and with a more considerable



reduction in yield. The best of the intervening seasons was in 1891, when from 142,000,000 acres were produced 3,400,000,000 bushels, worth $1,600,000,000, or an average of 24 bushels, but with a money value of less than $11 to the acre. For the following year the total crop fell to 2,800,000,000 bushels, and the average to 20 bushels, with a slight reduction in acreage, and proportionate returns. Of wheat there were produced in that year 516,000,000 bushels; of maize, 1,628,000,000, and of oats, 661,000,000 bushels, with acreages of 13, 23, and 24 bushels respectively. Considering the low prices then prevailing, and the still lower rates current during the following harvest season, it will be seen that except on a large scale, and with the most improved of labor saving appliances, the production of cereals is no longer a profitable industry.

Of hay there were produced, in 1890, some 40,000,000 tons from about as many acres; of cotton, 7,400,000 bales from 20,000,000 acres; of flax, 10,250,000 pounds of seed, and 240,000 of fibre from 1,300,000 acres. Of tobacco the average production may be stated at 500,000,000 pounds; of rice, one-fourth of that quantity, and of cane, beet, sorghum, and maple sugar, 400,000,000 pounds, or little more than ten per cent of the consumption; for the United States is a great sugar consuming country, using at least 60 pounds a year per capita of its population. Such are in brief the recent annals, and the present condition of leading agricultural interests as repre-



VIEW FROM NORTH GALLERY



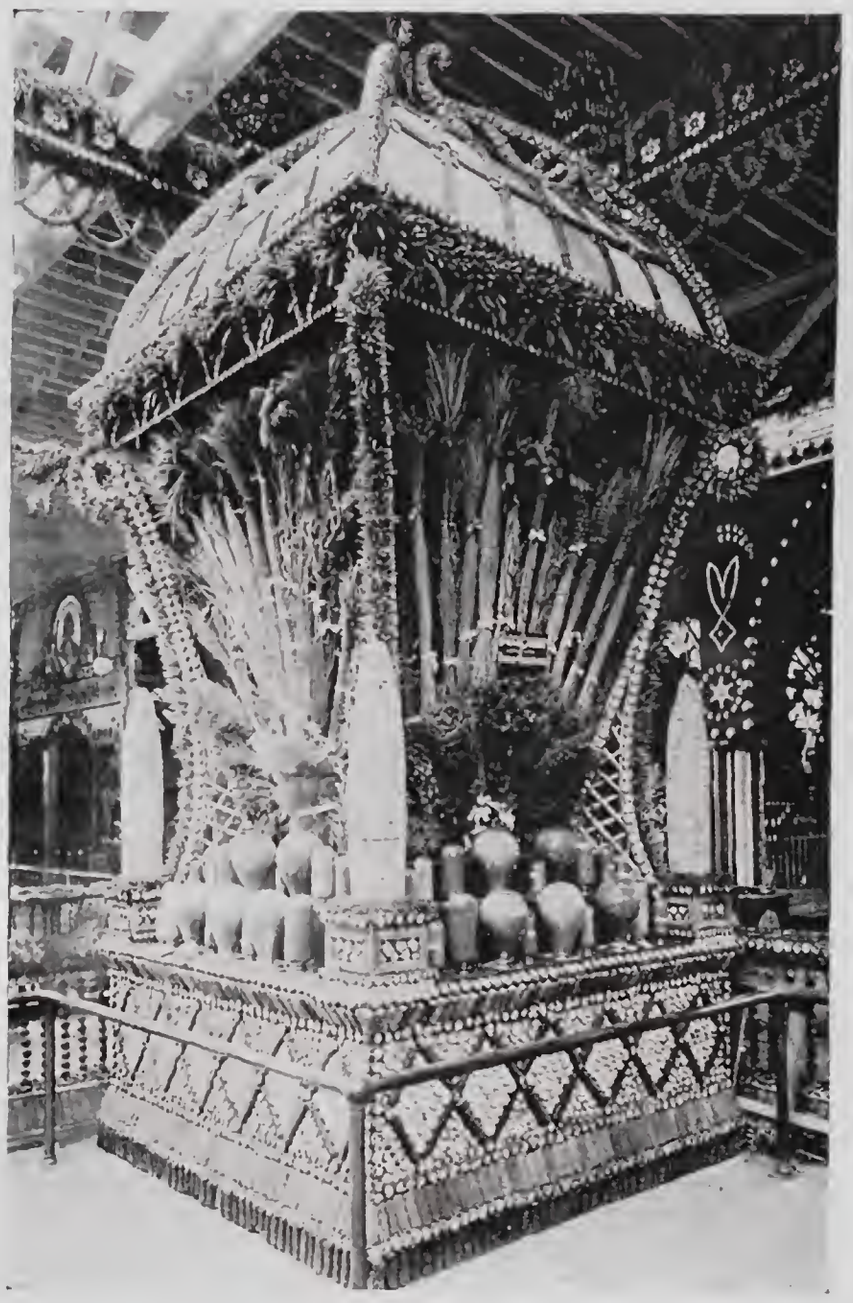
ROTUNDA

sented at the Fair, and nowhere can be compared to better advantage the products of the great food-producing sections of the republic, and these again with the products of foreign lands.



IOWA PAVILION

Between the annex and the central transverse nave of the main hall are the exhibits of the various states, of the American agricultural colleges, and experimental stations, and several minor foreign countries. Fronting on this nave are the pavilions of the leading agricultural states, including Iowa, Illinois, Ohio, Indiana, Minnesota, Wisconsin, Michigan, Nebraska, New York, Pennsylvania, Kentucky, and North Carolina. Iowa occupies a central position among the sisterhood, and one in perfect keeping with her geographical position. In her palace of corn, built in the Pompeiian style of architecture, are contained more than 130 varieties of grain. In front is a railing formed of long glass tubes, filled with samples of her soil, the caps above them composed of grains and other products. Red, white, and blue corn decorate the arches and pillars of the interior, in imitation of mosaic work, and at the base of each column are wisps and sheaves of grain. The pyramids within the palace, and the domes which surmount it, are artistically fashioned of corn cobs, kernels, and husks, while the less attractive exhibits, but those which better illustrate the cereal wealth of the state, are classified and arranged as grain in and out of the ear. The pavilion covers an area of more than 2,000 square feet, and aptly represents a form of industry in which at least two thirds of the exhibitors are engaged.



IOWA EXHIBIT

The pillars which support Nebraska's spacious pavilion are filled with her corn, wheat, and other grains, the first of these products being most extensively used in the decorations. One of the most important of her industries is the raising of corn for the manufacture of brooms, and these household articles are fashioned into several unique designs. In the centre of the Michigan section is a Corinthian temple, surmounted by a shield bearing her coat of arms. Above the main entrance is represented a family group, fashioned in corn and wheat, its four members on their way to the harvest field. The exhibits come



IOWA EXHIBIT

from all portions of a state whose surface and soil are greatly diversified, and hence are of a miscellaneous character, including wheat, corn, oats, rye, peas, beans, buckwheat, timothy, and clover, with many varieties of seeds, nuts, and vegetables, and a small display of melons.

Wisconsin's oaken pavilion, whose sides are formed of glass compartments for the display of cereal products, is typical of that substantial and prosperous state, while in the grouping of different grains in beautiful designs, and the decoration of the pillars and roof with the fruits of her soil are expressed the artistic tastes of one of the most cultured of western communities. There



NEBRASKA PAVILION



NEBRASKA EXHIBIT

in geometric figures, with wreaths and borders of feather-like grasses. The roof and entrance are also decorated with designs in wheat and corn, while above all its rich display is a bust of William Penn, calmly surveying the agricultural evolution of by-gone ages. On one of the panels are reproduced the arms of the state—two sturdy farm-horses, one of them in its harness, with a shield surmounted by an eagle, and the well-known Pennsylvania motto, Virtue, Liberty, and Independence. On either side are panels covered with green moss, and serving as a

are also photographs of model farm buildings, and of rural scenes, with a series of colored maps contributed by the chief of the weather service, representing climatic changes and conditions. The exhibit includes, in nearly 1,000 classes, all grades of wheat, corn, oats, barley, rye, buckwheat, peas and beans, with seeds of many varieties, as flax, timothy, red top, blue grass, millet, carroway, and clover, with hops, German vetches, and sorghum, and with grasses and forage plants of more than sixty kinds.

Heads of grain and native grasses form the appropriate materials of which largely consists the decorative scheme of the Minnesota pavilion, planned in a series of arches, and with pillars festooned in cereal and floral designs. Its chief ornament is the octagonal tower upon whose panels are pictorial effects in wheat and grasses, emblematic of the history and resources of the state. Among the grains, which are displayed in jars barley is a prominent variety, for in Minnesota a strong effort is being made to encourage the raising of this cereal for consumption by Canadian maltsters.

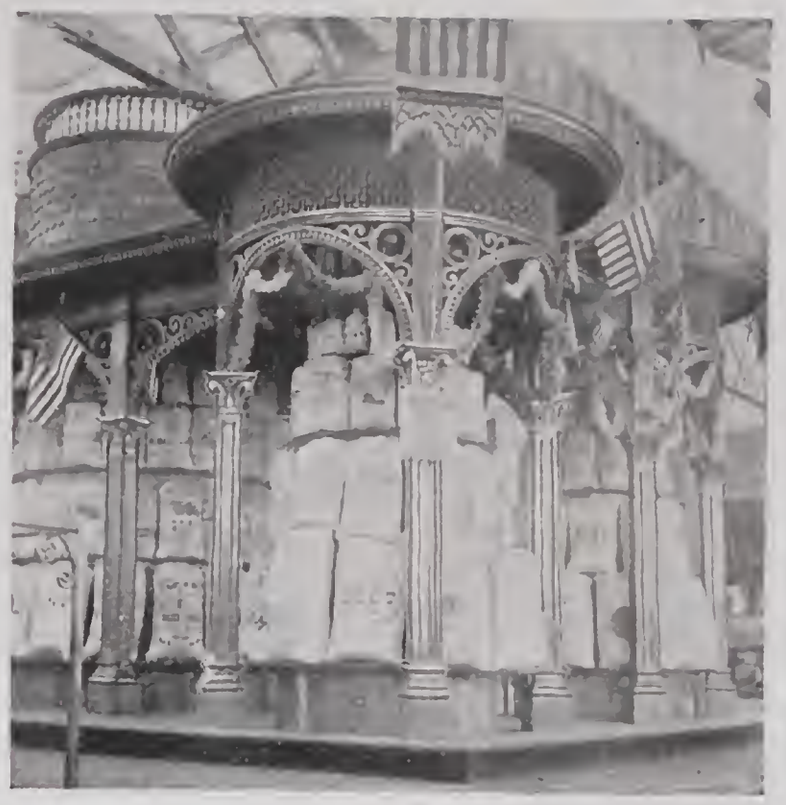
Facing the south-eastern section of the rotunda is Pennsylvania's exhibit, housed in a structure whose base is of many colored corns arranged



MICHIGAN'S SECTION



background for a group of agricultural implements adorned with ribbons, and wreaths of grass. Above the coat of arms is a keystone, fashioned of kernels of white and yellow corn. The keystone in truth is omnipresent, and in every conceivable design, so that never for a moment is the visitor allowed to forget that this, the so-called keystone state, is the one which held together the sections of the union in their hour of sorest trial.



FLOUR EXHIBIT, MINNESOTA

With its quaint and yet tasteful embellishment, its old-fashioned fireplace, where the chimney-piece, the chimney ornaments, and even the andirons are made of corn, the pavilion, with its wealth of decoration, forms of itself a more interesting display than its contents can possibly be. Among the latter are grains, grasses, and seeds in many varieties, with specimens of hops, and a case filled with tobacco in the leaf. An interesting exhibit is that of the Woman's Silk Culture association, whose headquarters are in Philadelphia. In the form of an illustration is the silk-worm feeding on the mulberry leaf, and near by are glass jars filled with cocoons, and bundles of raw silk, and spools of sewing silk, the latter in every shade of dye. Adjacent to this group are rich silken fabrics and festoons of flags draped around a goodly array of diplomas from prominent agricultural societies.



PENNSYLVANIA PAVILION

In a choice collection of photographs are represented Pennsylvania farm-houses of ideal type, embowered in orchards, and overlooking fertile fields. Tasteful and homelike are these habitations, some of them, though almost coeval with the declaration of independence, showing no signs of decay. Worthy of note also are the charts and handsomely bound agricultural reports, in which is a statement of the agricultural and mining products, and the commerce of Pennsylvania as compared with the sisterhood of states.

Next to the Pennsylvania collection is the pavilion of Illinois, one of the most ornate in the American section, though sharing the honors with other structures, and especially with that of Iowa. A commendable



PENNSYLVANIA SEED AND GRAIN

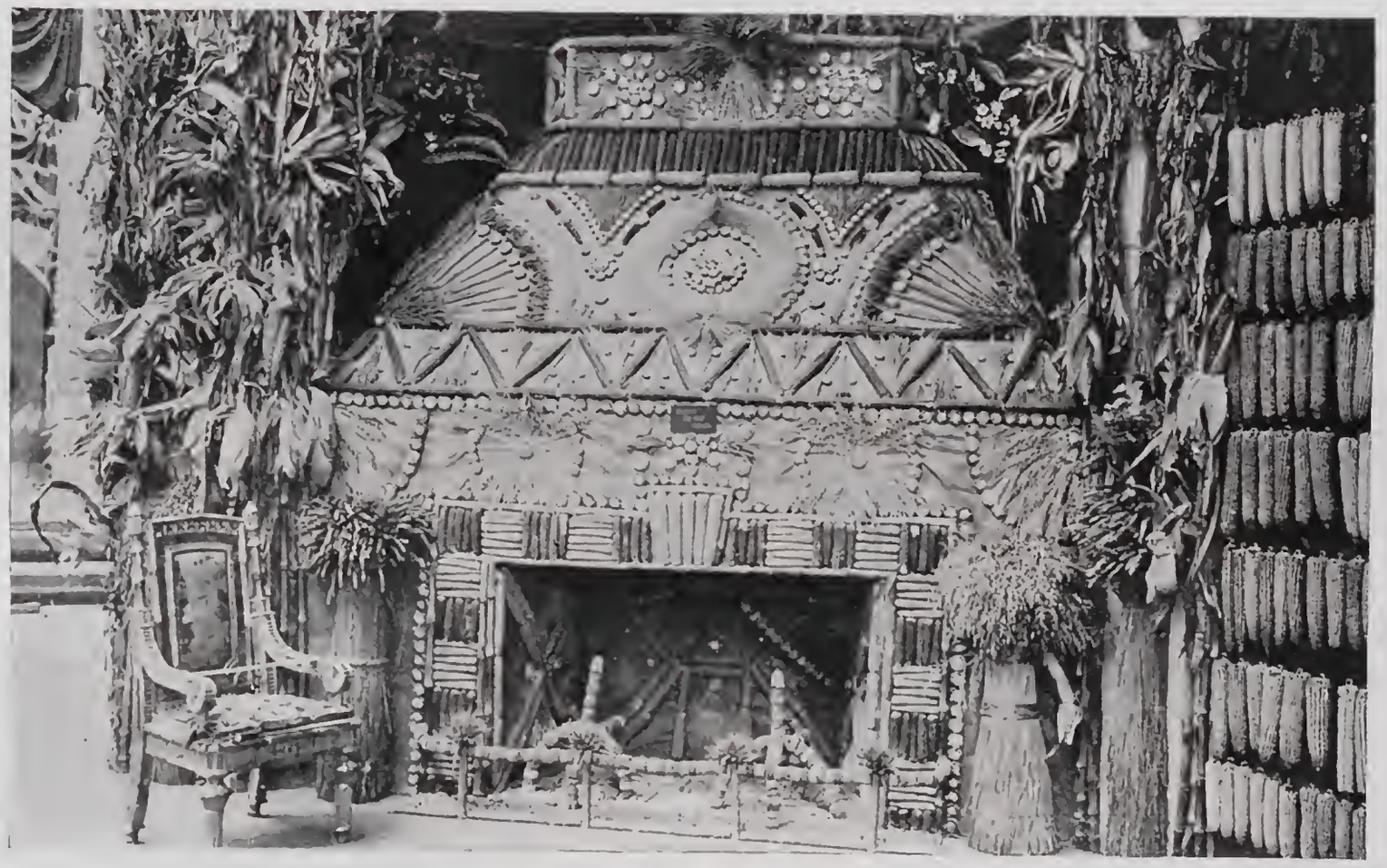


THE COLONNADE

feature, and one that is lacking in many portions of Agricultural hall, is its plentiful supply of comfortable seats, thus making it a favorite resort for tired visitors. There are four entrances to this pavilion, and in its centre is a corn pagoda, its base composed of jars of grain, and aptly representing one of the leading industries of a state whose crop of maize has averaged for a score of years more than 200,000,000 bushels. In glass cases set into the walls are numerous specimens of cereal and other produce, the several groups including many kinds of grain, grasses, and forage plants.



COAT OF ARMS, PENNSYLVANIA

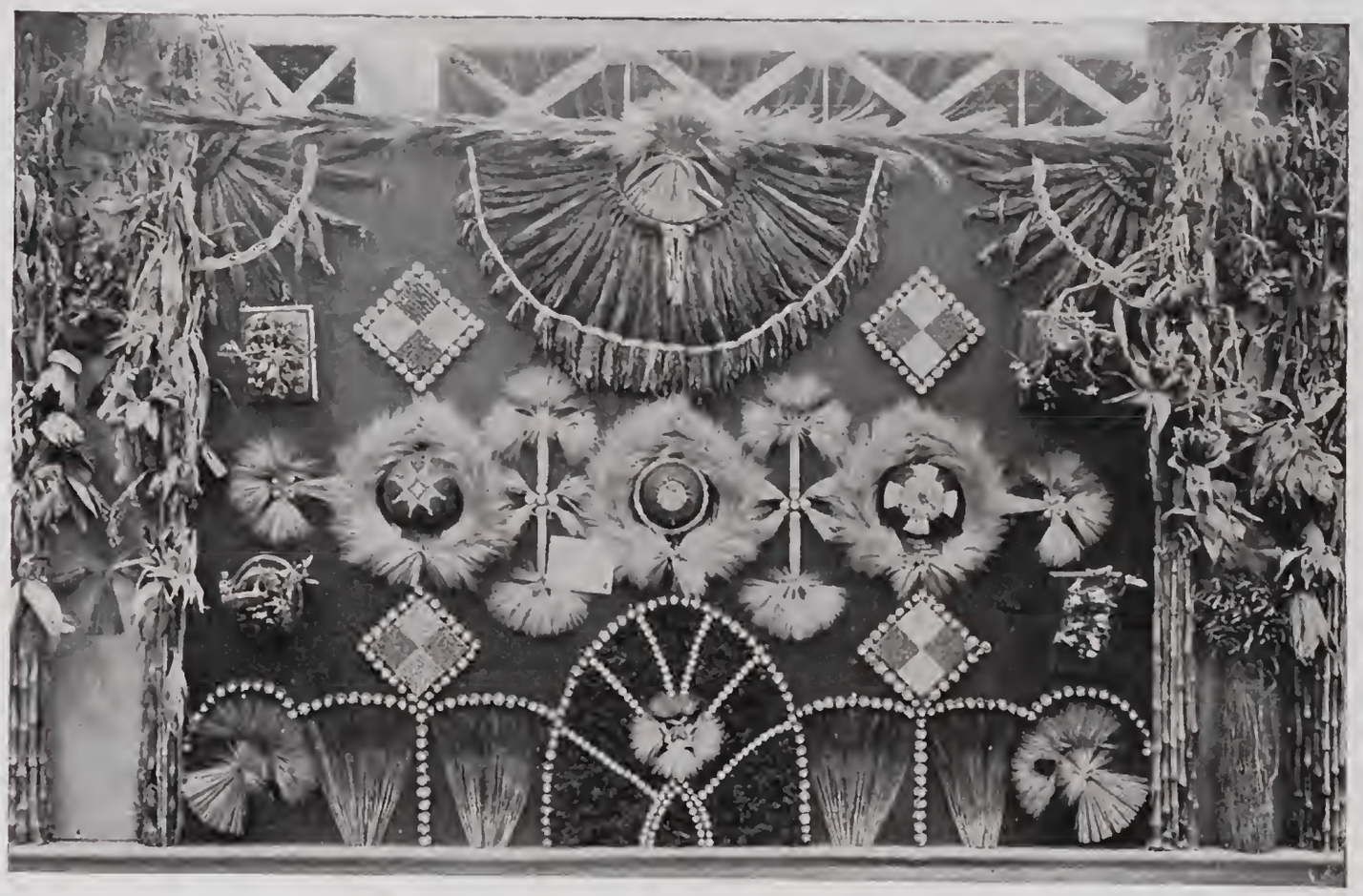


GRAIN AND SEEDS, PENNSYLVANIA

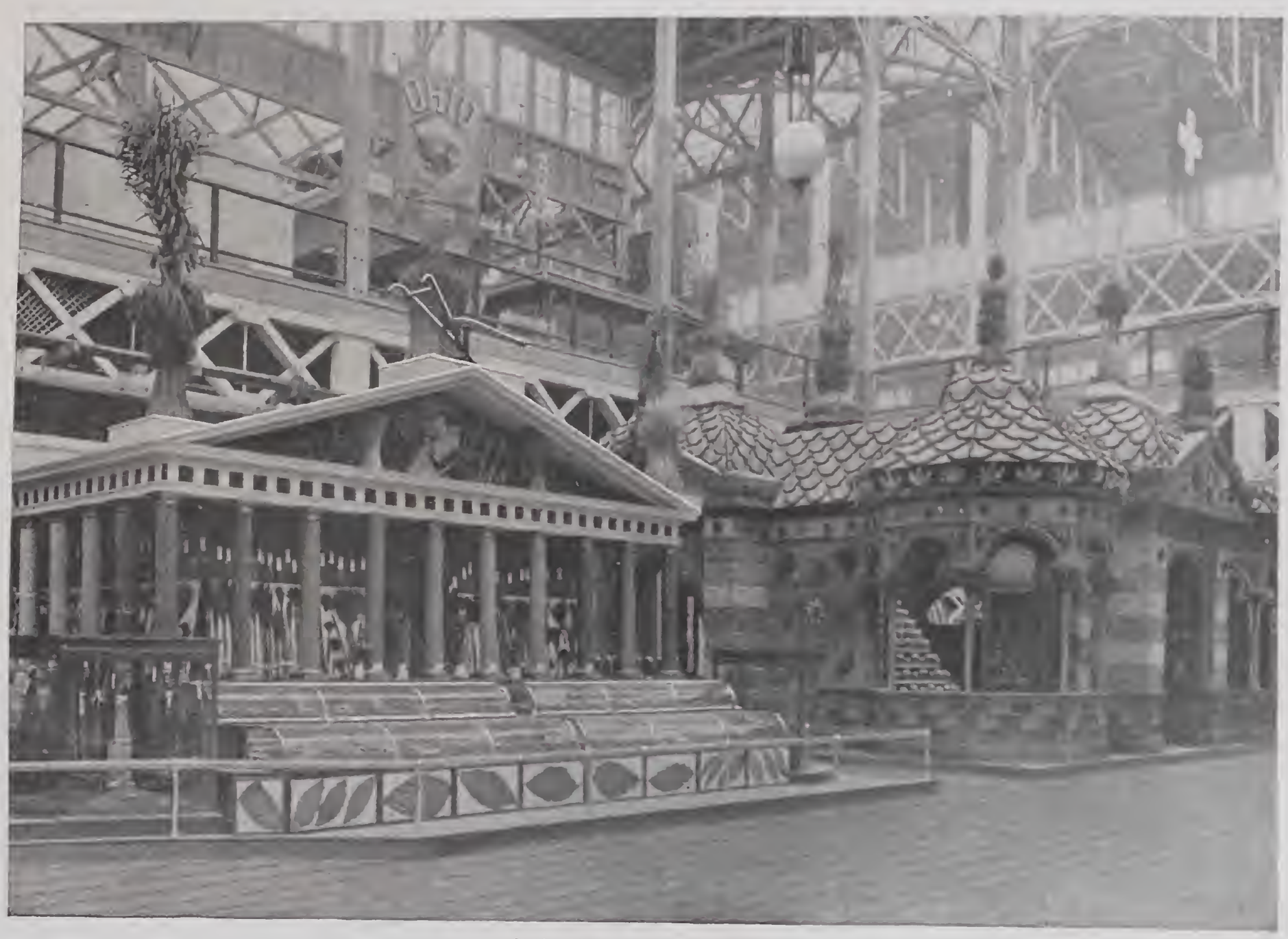
Two of the groups consist almost entirely of vegetables and broom corn; a third of sorghum, and sugar-cane; a fourth of tobacco, hops, and peppers, and a fifth of hemp, flax, and cotton. Worthy of note is the variety of articles displayed by single exhibitors, many of whom show, side by side, their samples of wheat, corn, oats, barley, rye, buckwheat, grasses, and forage plants, thus illustrating their diversity of products, for the Illinois farmer, like the Illinois merchant and manufacturer, is fully abreast of the times.

In structural design the Ohio pavilion resembles somewhat a Roman temple. The glass columns which surround it are filled with cereals so arranged as to present a pleasing color effect; the cornice is also composed of glass compartments, through which the grains of Ohio are exhibited in all their variety and richness, and on the walls in various receptacles, or in the form of interior decorations, are 130 varieties of wheat, 128 of corn, 37 of oats, and 102 of grasses, with a creditable display of beans and tobacco. In the centre is an office with reception room, in which is a collection of standard works on agriculture.

In Kentucky's pavilion leaf tobacco, corn, wheat, hemp, grasses, and blue-grass seed form the bulk of the exhibits, all of which are

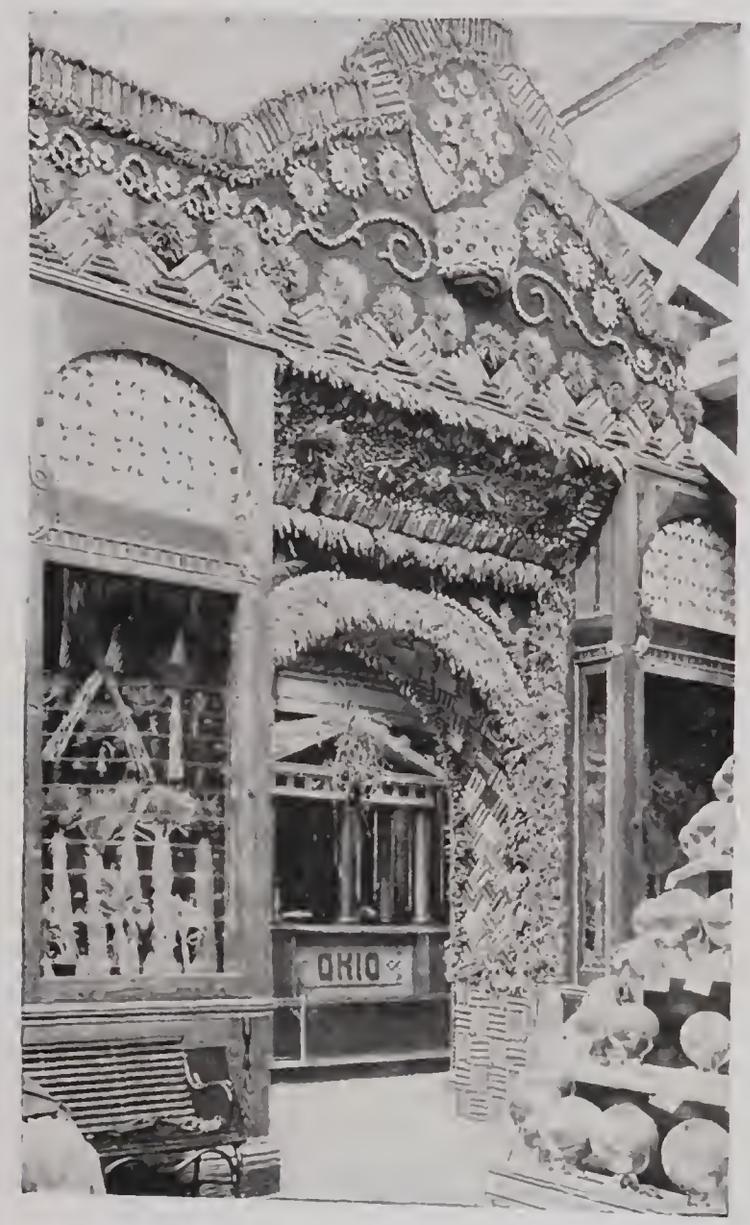


ORNAMENTAL DESIGNS IN GRAIN AND SEEDS, PENNSYLVANIA



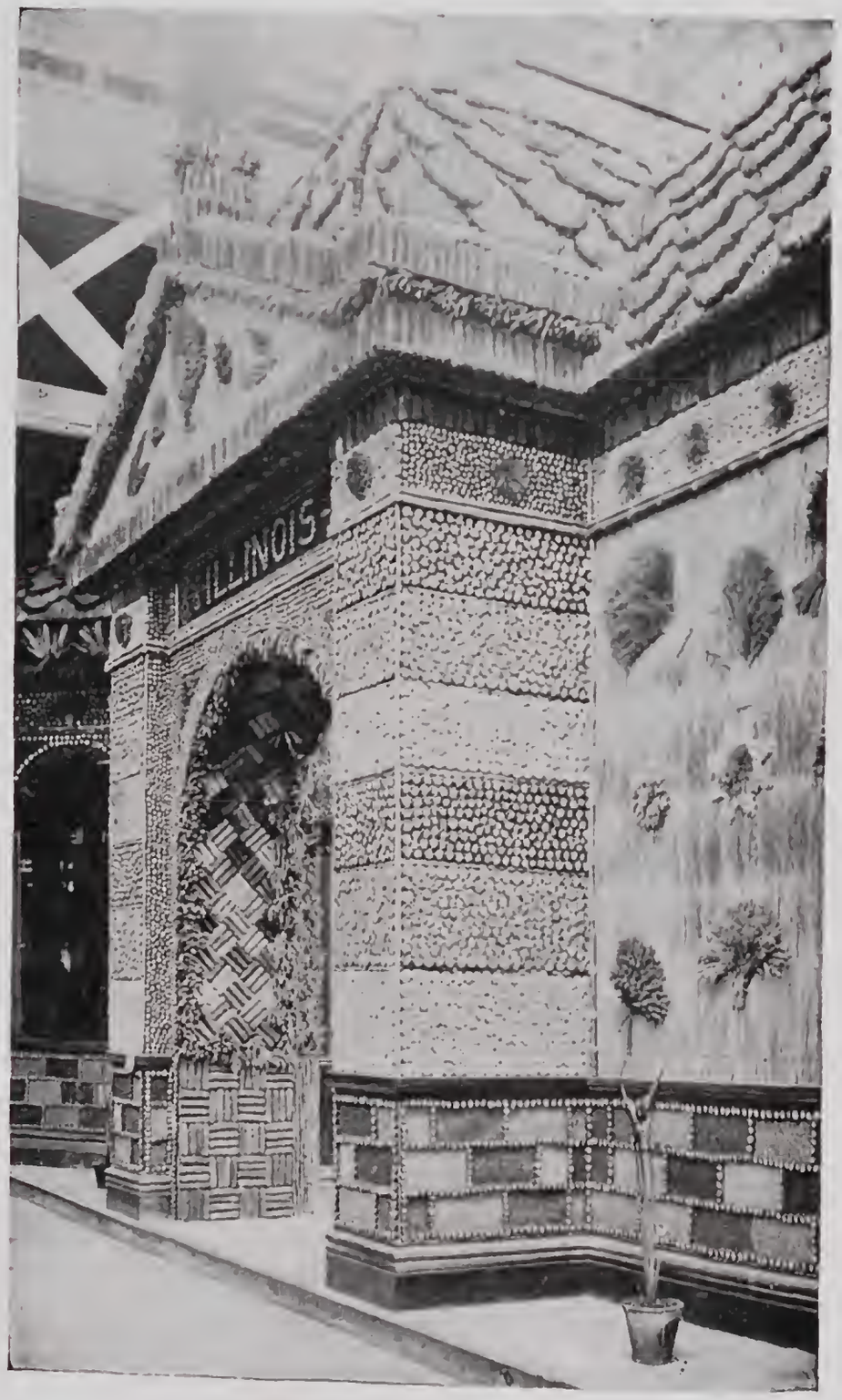
OHIO AND ILLINOIS PAVILIONS

worked into structural forms or otherwise skilfully arranged. Of the three groups under which the collection is classified the largest consists of tobacco, of which there are more than a hundred exhibitors, the description known as Burley leaf being repeated in several score of specimens. Indiana, whose section lies east of the Kentuckian group, is liberally represented, as befits a state which ranks among the foremost in volume and quality of cereal products, displaying also many varieties of grasses, hay, and seeds.



SECTION ILLINOIS PAVILION

Indiana's exhibits are installed in a pavilion of white, the section fronting the façade being decorated with corn in the ear, and grain in the straw. Within there are three large structures, covered with jars filled with the cereals of the state, a shaft of corn, not unlike an Egyptian needle, rising above them all. In cases are other specimens of wheat and oats in the stalk, collected by the head of the agricultural experiment station, of Purdue university. An artistic



ENTRANCE, ILLINOIS PAVILION



SECTION OF THE MISSOURI EXHIBIT

feature is a large wreath of artificial flowers on one of the cases, made by a woman from many varieties of grain and nuts, and containing also a grasshopper, bee, beetle, guinea egg, pinching bug, and the tusk of a hog. To the Indiana exhibit the weather bureau contributes several maps, showing the precipitation, temperature, and rainfall within the state for a period of twenty-two years, and elsewhere are maps presenting data as to altitudes, drainage, live-stock, and agricultural products.



MISSOURI CEREALS



THE BRIDGE, MISSOURI PAVILION

The home of the empire state, somewhat out of place, as it would seem, among the western and southern exhibits, is a plain, unpretentious structure, almost severe of aspect; but in the several groups and several hundred classes contained therein is one of the best and largest collections in Agricultural hall, arranged with skill and method, and displaying to excellent advantage her manifold products and resources. As in other sections, grain forms the bulk of the display; but of beans there are nearly 100 specimens, with grasses, leaf tobacco, hops, flax, and syrup made from the cane. The picking and preparation of hops, one of the most picturesque of out-door industries, are fully illustrated, and flax in its various forms, from the time it is harvested until made ready for the manufacturer, is also a feature in the New York collection.



ENTRANCE, MISSOURI PAVILION

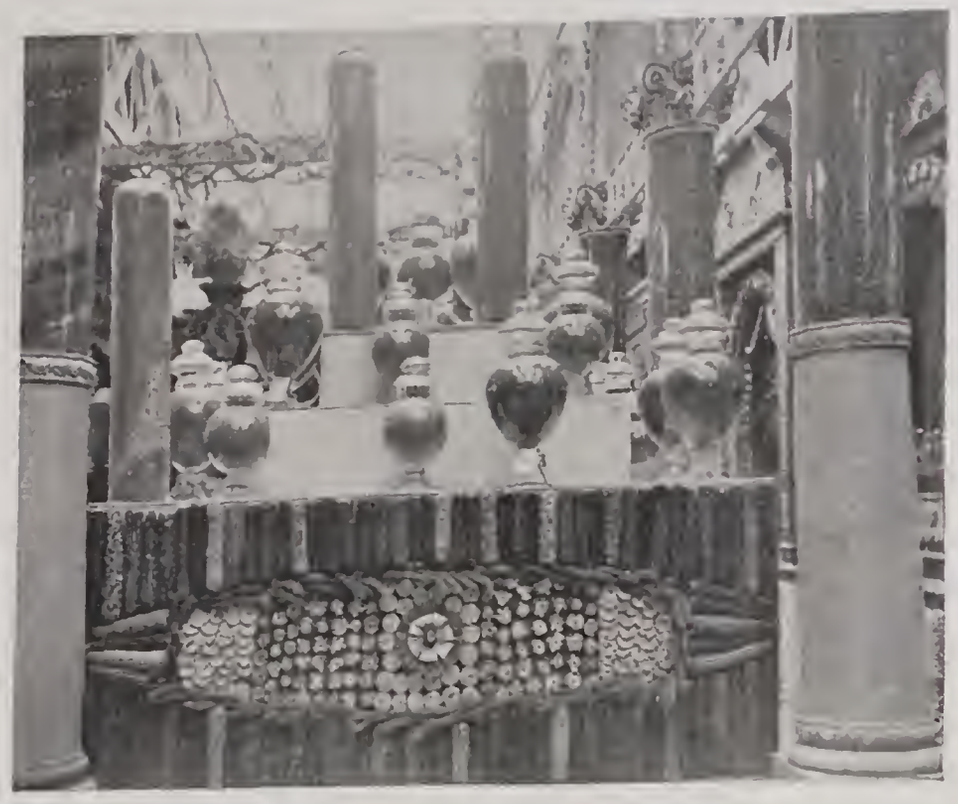
North Carolina completes the group of states that fill the place of honor fronting on the central nave, which is thus divided among the middle, western, and southern sections of the country. In her glass pavilion, divided into convenient partitions, the first group consists of cereals, grasses, and grass seeds, in more than 350 classes. Then come sorghum, and sorghum and sugar-cane syrup and seed, of which there are some fifty exhibitors. A third group consists entirely of peanuts, and a fourth almost entirely of beans. In another



ENTRANCE, NEW JERSEY PAVILION



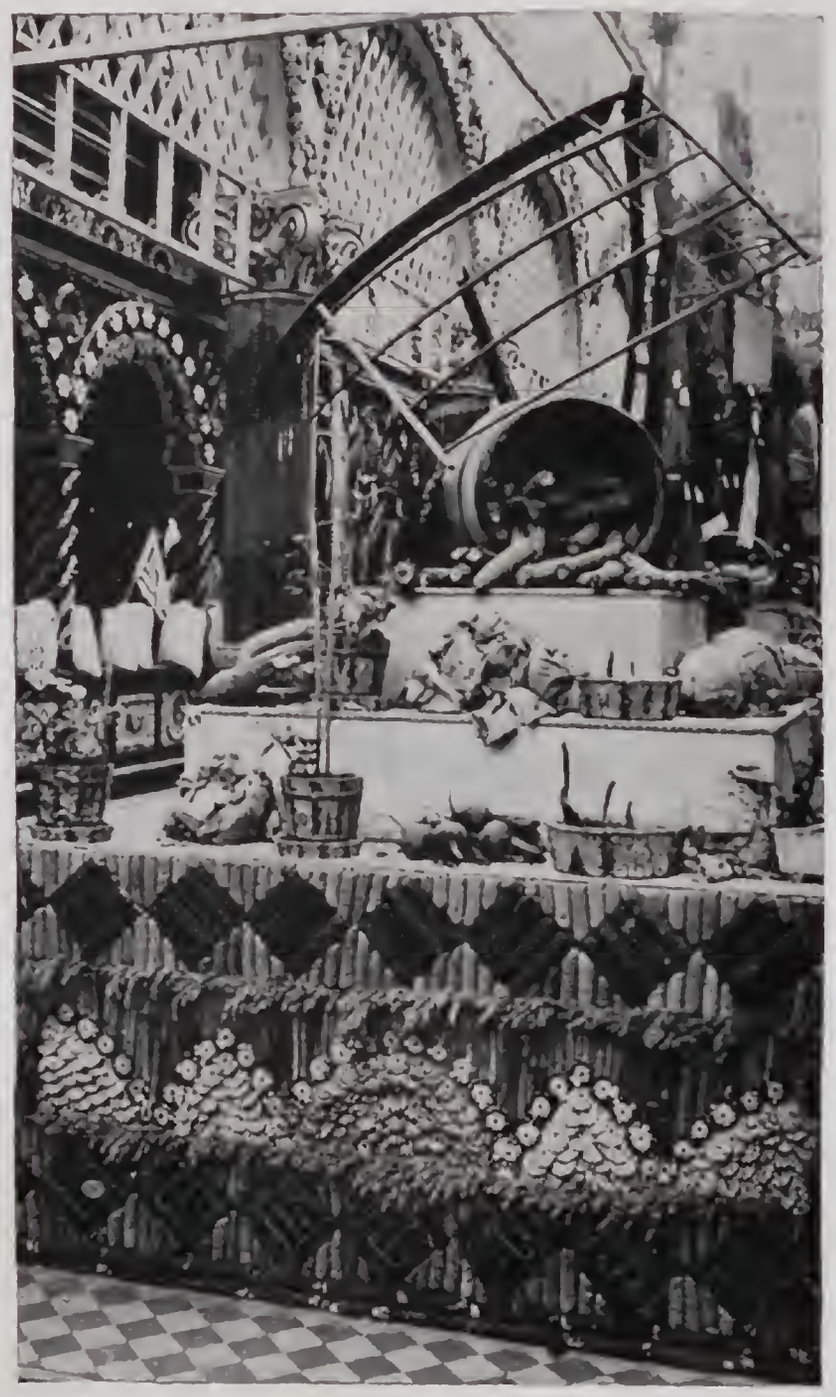
CORNER OF NEW JERSEY PAVILION



NEW JERSEY CEREALS

group cotton lint, seed, and bolls are repeated in two-score specimens, and among them is a little flax and flax-seed. Of hops and tea there are single exhibits, and of interest to scientific agriculturists are the samples of the soils best adapted to staple products.

Near the eastern portal Missouri occupies one of the largest sections allotted to a state exhibit. An ornamental railing encloses the pavilion, which is in four compartments, and in the centre a pyramid, on whose sides are worked in grains and grasses the Missourian coat of arms, the seal of the United States, and a Columbian medallion. From this pyramid rises a shaft of grain, surmounted by a terrestrial globe of silk, with the state of Missouri in exaggerated scale. On either side of the arched doorway at the principal entrance is a case containing the choicer varieties of Missourian grasses, and grains, tobacco, flax, hemp, sorghum, and castor beans are elsewhere displayed in nearly 200 classes.



IN NEW JERSEY PAVILION

Around the stairway leading to the gallery which divides this section is a palace of corn, which serves as an office and reception room. Here is illustrated in the form of statistics and maps the growth of a leading branch of Missouri's industry, her corn crop reaching, and at times exceeding 200,000,000 bushels a year. All classes of cereals are also displayed in the shape of a terraced embankment, composed of jars of grain, and surmounted by *an equestrian figure* of Washington. A model of the great St Louis bridge, fashioned of sugar-cane and ornamented with grain, occupies another portion of the pavilion, in the construction and decoration of which there are samples enough to load a sea-going ship.



GRAIN ARBOR, NEW JERSEY

Except for Louisiana, the remaining exhibits of the southern states are grouped to the east of Missouri's pavilion. Here the two Virginias and Florida display their modest assortments in neat and tasteful pavilions, the Old Dominion giving the place of honor to tobacco with her wheat, corn, and oats in the background, while her western namesake reverses this arrangement. The state commission, the Louisiana Sugar exchange, and the New Orleans board of trade and Cotton exchange were mainly instrumental in organizing a series of exhibits which illustrate the methods of cultivating, harvesting, and milling rice; of producing sugar, molasses, and syrups, of raising cotton, and manufacturing cotton seed oil. They have also a large display of tobacco and cereals, together with specimens of soils which experiment and chemical analysis have shown to be best adapted to staple products.



SOME NEW JERSEY EXHIBITS

In the exhibit of the Louisiana Sugar exchange are photographs representing plantation laborers, warehouses and other buildings for handling manufactured products, and scenes within the exchange itself. The state exhibit



CEREALS



COTTON, NORTH CAROLINA

is divided into two main sections, designed to illustrate the development of the rice and the sugar industries. The so-called rice pavilion is thatched with the straw of that grain, resembling somewhat one of the Javanese houses on the Plaisance. It is surmounted by a marine monster in upright posture, with large eyes of bright colored glass. The pillars and walls of the sugar pavilion are of cane, both structures displaying the most artistic workmanship, and so arranged that they appear as one.

A portion of the Florida section is occupied by a Grecian pavilion, which serves as the official headquarters, tastefully furnished with exterior decorations of tropical plants, jute, sugar-cane, and other native products. Among the exhibits are samples of soil reclaimed from the coast lands and everglades, those of the produce of the soil consisting of specimens of sugar, rice, cider, wines, honey, preserved fruits, and early berries, the last including a jar of strawberries gathered in the month of February. The small but tasteful and well ordered collection of Maryland completes the southern display, except for an assortment of Texan wools contained in the gallery. North and east of the Maryland pavilion are those of New Jersey and Delaware, the contents of which are to be commended for quality rather than quantity. Especially neat and homelike is the display of New Jersey products, above which is inscribed the following legend: "The battle ground of the Revolution, on whose fields many of these exhibits were grown."



The New England participants are Massachusetts, Connecticut, New Hampshire, and Maine. Tobacco is a feature in the exhibits of the first two states, notwithstanding that in the former its cultivation has been strongly opposed by certain classes. The exhibit of Massachusetts is skilfully arranged, and includes photographic illustrations of many of her crops, with literature bearing upon agricultural topics. As an exposition of New England husbandry, which differs widely from western methods, a considerable space is devoted to what is termed intensive farming, ravages of the gypsy moths, and other insect plagues. Within a glass case is a tree covered, and partially destroyed by the worms, with birds perched on the trunk, and barnyard fowls at the base in the act of devouring them. New Hampshire has an attractive display, in a small red building enclosed with a rustic fence, and representing the typical New England granary, near which are tables covered with jars of grain. In the yard are benches and easy chairs, an old-fashioned flax-wheel, plough, and other agricultural implements of colonial times. On either side of the door are compartments



NORTH CAROLINA COTTON

Here, also, is shown how to check the



IMPROVED TOBACCO CURING BARN



OKLAHOMA

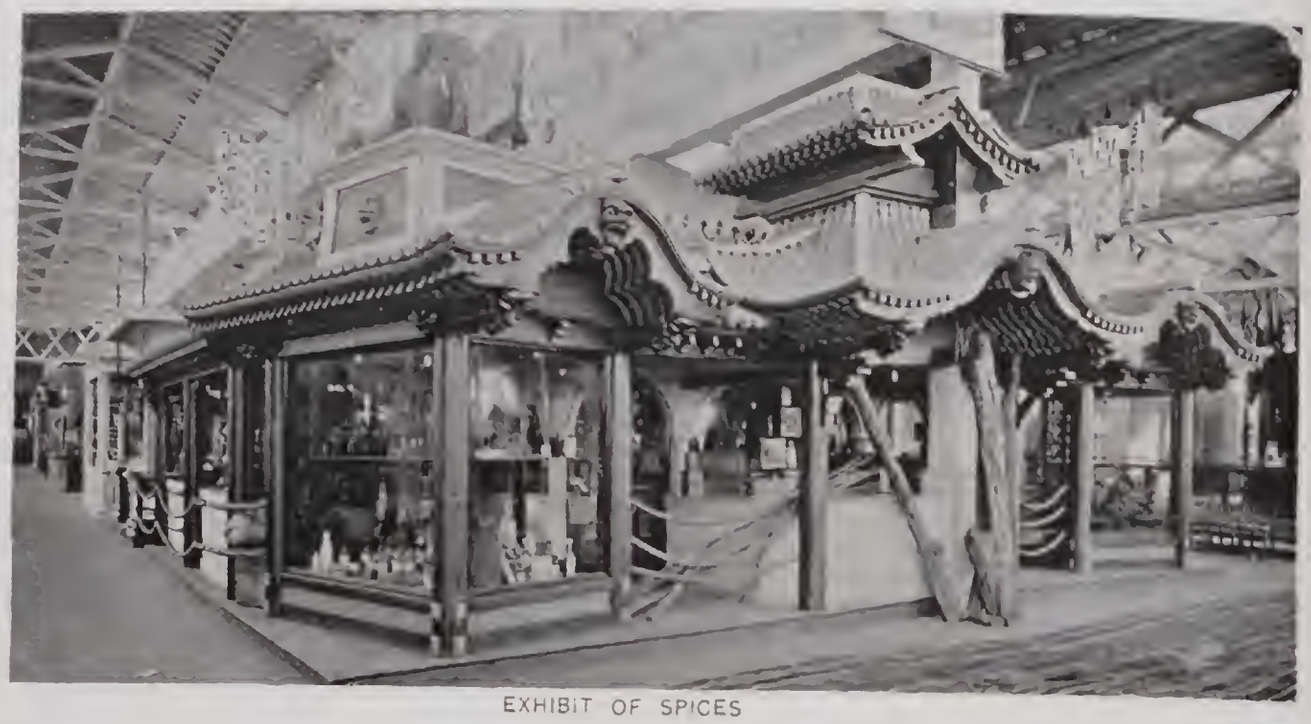


EXHIBIT OF SPICES

in which are specimens of the sugars and syrups for which the state is noted.

Across the passageway from the New Hampshire building is a pavilion bedecked with the brightest of the primary colors, that of Oklahoma, recently re-christened by its territorial legislature, the Mistletoe state, for this plant is found there in great abundance. As shown by the exhibits, its soil yields wheat, cotton, clover, maize, sorghum, timothy, oats, rye, barley, flax, and kaffir and broom corn. Considering that this territory is little more than four years old, her display is most creditable, and one that augurs well for her future.



SOUTH DAKOTA'S PAVILION

Surrounded by the Pacific coast exhibits is the pavilion of South Dakota, the main entrance of which is in the form of a large triumphal arch, with a doorway on either side. The pillars, arch, doorways, and the supports of the section walls consist of the trunks of trees which were cut in March, 1893, many of them bearing twigs in full leaf. Wheat and grasses comprise the bulk of the exhibit, among the latter being specimens of the switch variety more than thirty feet long. Separated from this section by the California pavilion are those of North Dakota and Kansas, the former containing a profuse display of cereals, both in decorative and exhibitory forms. Above her pavilion is a woman of heroic stature, her right hand resting on a shield, and holding in her left a banner, the entire composition fashioned in grain, as are other elaborate designs. In the Kansas structure, rich in its golden hues, is proclaimed her rank as among the foremost of corn-producing states, the figures above the principal entrance indicating the year of her admission to statehood, and that in which was dedicated the World's Columbian Exposition.



SOUTH DAKOTA GRAINS



DEVICES IN GRAIN AND GRASS, NORTH DAKOTA

Of the Pacific states, grouped almost in the centre of the American division, some are well represented in the Agricultural department, while others have but a slender display. First may be mentioned that of California, as the largest grain producing state in the group, one that in 1850 imported



CALIFORNIA GRAINS

almost her entire supply of cereals, and now ranks among the leading sections of the republic in yield and export of wheat. In occasional years California has led all the rest in volume of production, and is among the few whose crop for a single season has exceeded 60,000,000 bushels. Of maize, a few million bushels a year are raised, and of barley, mainly for horse feed and brewing purposes, from 15,000,000 to 20,000,000 bushels, with a moderate export demand.

But cereal farming, and especially wheat farming, is no longer a profitable industry in California, unless conducted on a large scale, and with improved appliances. For this the reasons are not far to seek, with wheat selling, as in recent years, at from 70 to 80 cents a bushel, with labor at $2 a day in the harvest season, and often not to be had at that. Then there are excessive freight charges, with delay and difficulty in moving crops, large quantities of wheat remaining unhoused by the side of railroad tracks, where at times it becomes spoiled while awaiting transportation. No wonder that the smaller class of grain-growers cannot compete with those of Russia and Hindostan, where freights are almost nominal, and wages from a fourth to a tenth of California rates. But on the larger farms, some of them with many thousands of acres planted in wheat, the use of steam power in ploughing, planting, and harvesting has so diminished the cost of production, that in favorable locations wheat can be raised and placed at tide-water for less than thirty cents a bushel.



CALIFORNIA WHEAT

Of hay the California crop is from 1,500,000 to 2,000,000 tons, largely of alfalfa, as there is named the lucerne of the eastern states. With the aid of labor-saving appliances this can be raised at a cost of $1 a ton, inclusive of cutting, curing, and stacking, while on irrigated lands three or four crops a year, each of as many tons to the acre, are no uncommon yield. Vegetables are largely raised, and especially beans and potatoes, the average yield of the former exceeding 50,000 tons, mainly of the Lima variety, while of the latter and of winter vegetables many thousands of tons are shipped to eastern markets. Of sugar-beets the product is from 10,000 to 15,000 tons a year, with three beet-sugar mills in operation, one of them the largest in the United States. All these and other industries are represented in the Agricultural department, and what has been said in this connection applies in a measure to other sections of the Pacific slope.

In comparison with the display in her state pavilion, the one contained in the Agricultural building is almost insignificant. And yet there are in this collection more than 70 exhibits of cereal crops, with 50 or more of beans, potatoes, and other vegetables, and several each of hay, grasses, and grain in the straw, and of olive oils, while of silk cocoons, and cotton on the stalk there are also single exhibits. Though not an imposing display, all the leading agricultural districts of the state, and nearly all their products, are represented in these California groups, and among them are the usual specimens of phenomenal growth, including melons, pumpkins, and beets, with potatoes one of which would almost suffice for a family dinner.



CALIFORNIA CEREALS

The booth itself is a plain unpretentious structure of glass and wood-work painted in light colors, and with little attempt at ornamentation.



CALIFORNIA CORN



NORTH ENTRANCE TO AGRICULTURAL BUILDING

In the centre is a wigwam of unique design, constructed of Indian corn, and elsewhere are bouquets deftly fashioned of native grasses. The exhibits are neatly arranged, and show to the best advantage their several classified groups. But in other departments of the Fair, especially in the Mining and Horticultural sections, and above all in her own home among the state pavilions, California is seen to better advantage. Her display of fruit, for instance, is by far the best on exposition, representing one of her largest and most progressive industries, one that with cheaper freights is capable of almost unlimited expansion; for to the consumption of fruit in crowded eastern centres there are no practical bounds, if it can be hauled to market at rates that will leave a fair profit to the producer, while placing it within reach of the great army of wage-earners. All this will come in time; and as the golden age of pastoral days was succeeded by the age of gold, as mining gave place to agriculture and stock-raising, so are these latter yielding the precedence to fruit-growing, which promises erelong to lead all other industries, as even to-day it does in the southern portion of the state.



NEVADA'S EXHIBIT

Next to California, Oregon ranks first among the wheat producing sections of the Pacific coast; for ever since the days when were sown on methodist mission lands the first wheat planted in the Pacific Northwest, grain growing has there been a favorite pursuit. In her pavilion, which for reasons best known to the management was sandwiched between those of the southern and middle states, is a large collection of cereals, vegetables, grasses, and forage plants, fairly representing this stable and industrious community, one of the most steadily prosperous in the United States.

Of similar character are the exhibits from Washington, whose production of wheat has increased nearly four-fold during the decade ending with 1892, while for the same period Oregon shows but a slender gain, and California a decrease in yield. Of sheaf grain there are countless specimens, including cereals of all descriptions, and of threshed grain there are many varieties in display and decorative forms. Among them is wheat that has yielded nearly 100 bushels to the acre, and oats that have produced even more abundantly, with timothy hay nearly nine feet high, with vegetables of wonderful size, a complete assortment of field and garden seeds, and flax in all its stages of growth. Farm buildings and incidents are reproduced in photographic illustrations, and there is a chart containing farm and crop statistics, while climatic conditions are represented as taken from government reports. Few of the Pacific or other states have displayed such interest in the Fair as this, one of the youngest of the sisterhood, two of her citizens taking on themselves the task of preparing an exhaustive exhibit from the counties in which they resided, while a third erected at his own expense, and stocked with grains and fruits, a pavilion in the Washington section.

Nevada, it need hardly be said, is not an agricultural region, though gaining steadily in this as in other branches of industry, now that she has fairly recovered from the depression caused by the faded glories of the Comstock. Except on irrigated lands, cereals can only be raised to advantage in a few locations, as in portions of Elko county, where 30 bushels of wheat to the acre or 50 of barley are no uncommon yield. The exhibits consists mainly of grains and grasses, arranged in frames, and housed in a neat and tasteful pavilion.



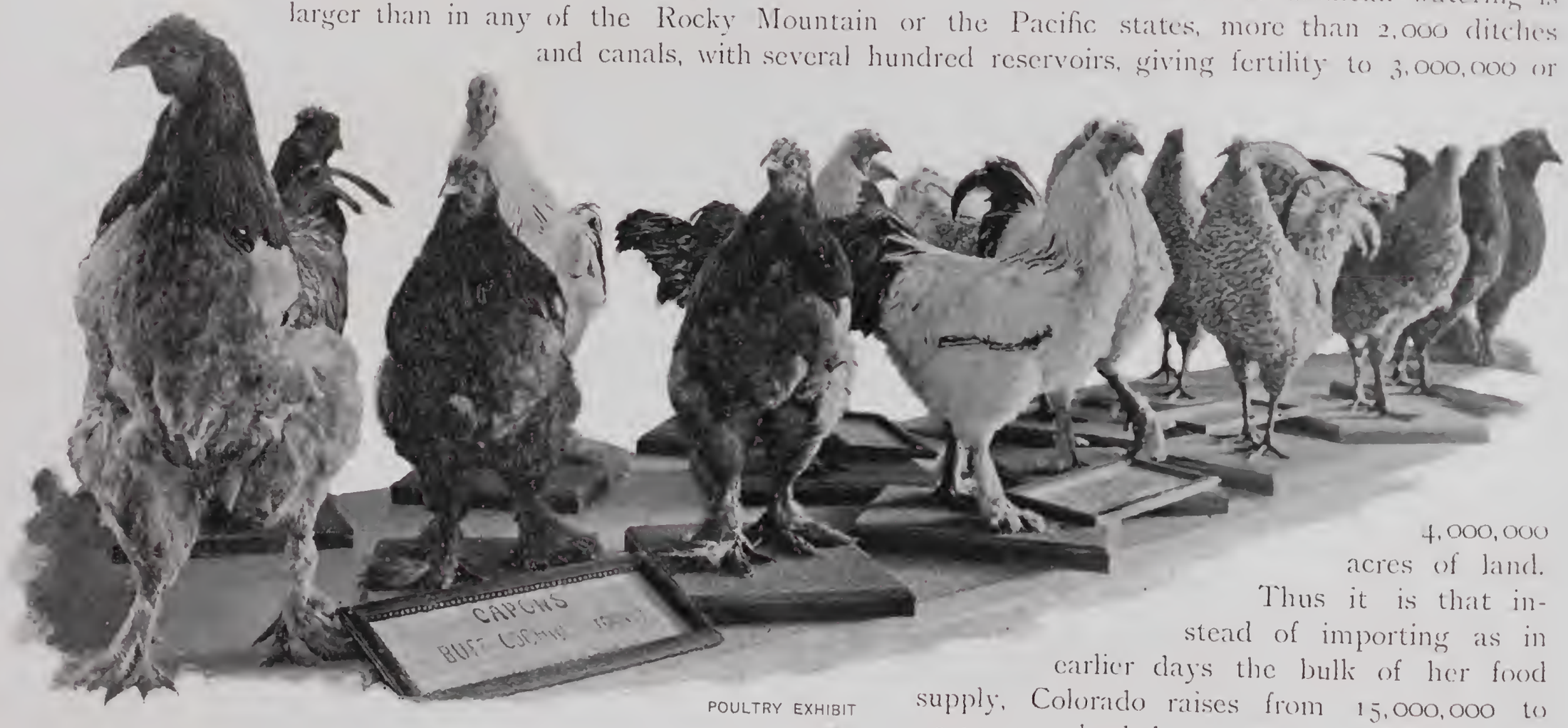
BOTTLED BEER FROM DENVER

Utah's exhibit is well worthy of the community which, during its exodus from Nauvoo, halted midway on its journey to plant and gather grain, near the spot where now stand the cities of Council Bluffs and Omaha. Nowhere in the United States, and probably nowhere in the world have irrigation systems been developed with more economic method or with better results. When in 1846 the Mormons entered their western Zion, their land of Deseret, the first task to which they applied themselves was the construction of irrigating ditches. Twenty years later, when elsewhere on the Pacific coast artificial watering was almost unknown, nearly 300 canals had been built, with a total length of more than 1,000 miles, and conveying the mountain streams and melted snow to 170,000 acres. By 1892 the various systems had been so enlarged as to absorb nearly all the available water, the supply of which formed the only limit to further enterprises. Thus it is that several million bushels a year of cereals are raised on the arid soil of Utah, almost entirely by Mormon farmers; for the saints are essentially a farming community, leaving to their gentile friends the control of commerce and mining.

On a sign attached to the Utah pavilion, which lies west of the Washington section, it is announced that everything contained therein was produced by irrigation. A large relief map represents the Malade valley system, with the waters of the Bear river canal and its branches, giving fertility to 150,000 acres of land. In the centre of the booth is the national flag, fashioned of lambs' wool blanketings. A pile of salt made from the waters of the great lake is walled in with bags of salt ready for use or export, and in a series of photographs are shown the natural gas wells in the neighborhood of Salt Lake City. Here also are displayed the nutritious grasses of the territory, with samples of its soil, and its clear unfiltered river water, while of cereals there are many samples, with a few of vegetables and vegetable seeds.

South of the Utah section are the exhibits of Idaho and Colorado, the former including the usual cereal collection, with some remarkable samples, as corn-stalks more than twice the height of a man, and on which are several cobs. In addition to grasses and hay, with vegetables and seeds, of many descriptions, there are specimens such as in former years it was declared impossible to grow on Idaho soil, among them leaf tobacco, flax, and Swedish turnips; but in truth there are few agricultural products that cannot here be raised on irrigated lands.

In the Colorado section is sufficient evidence that she is no longer, as some imagine, merely a mining and stock-raising region. Except for California, her area of land under artificial watering is larger than in any of the Rocky Mountain or the Pacific states, more than 2,000 ditches and canals, with several hundred reservoirs, giving fertility to 3,000,000 or 4,000,000 acres of land. Thus it is that instead of importing as in earlier days the bulk of her food supply, Colorado raises from 15,000,000 to 20,000,000 bushels a year of cereals, with 80,000 to 100,000 tons of hay, and of vegetables and dairy products more than suffices for home consumption.



POULTRY EXHIBIT

On the frieze of the pavilion are depicted scenes representing the agricultural development of Colorado, and within, her irrigation system finds expression in a model of one of her irrigated valleys. In this structure no wood-work is visible, the entablature resting on arches covered with native grasses, and these on columns wrapped with grain. Among these groups is every variety of grain, threshed and in the sheaf, including some 400 specimens of wheat, 100 of oats, and 70 of barley and rye. There are samples of wheat which has yielded more than 50 bushels; of oats that have produced 130; and of barley, 80 bushels to the acre; but these are of course exceptional returns. In the centre of the display are shown the comparative quantities of grain raised on Colorado soil between 1874 and 1892. Of buckwheat, millet, and broom and Egyptian corn, there are a few samples; of flax a special group; and from Kiowa county, sorghum and sugar-cane.

Of native grasses and forage plants there are more than 100 varieties, a much larger number than was displayed at the Denver exposition of 1884. These are contained in the exhibits of the Colorado Agricultural college and the state commission, and show to excellent advantage the rich pastoral resources of the silver state. Among them are the grama and bunch and buffalo grasses which form the mainstay of sheep and cattle ranges. The cultivated species include sheaves of alfalfa, four to six feet high, bunches of clover two feet in height, and timothy hay with heads two inches long. Finally there is a collection of all the field and garden seeds of economic value.

Wyoming and New Mexico occupy small spaces in Agricultural hall, the former to the east, and the latter to the south of the California section. In both, the production of cereals and fruits is rapidly gaining ground under the stimulus of irrigation, and especially in Wyoming, this, the youngest of all the states, now ranking third in area of irrigated land, and second in mileage of irrigating canals. Her exhibit includes grains arranged in glass tubes, with native and cultivated grasses, hay, and vegetables, all produced, as is stated, by artificial watering. The New Mexican group consists entirely of grains, and especially wheat, of which there are nearly 500 samples.

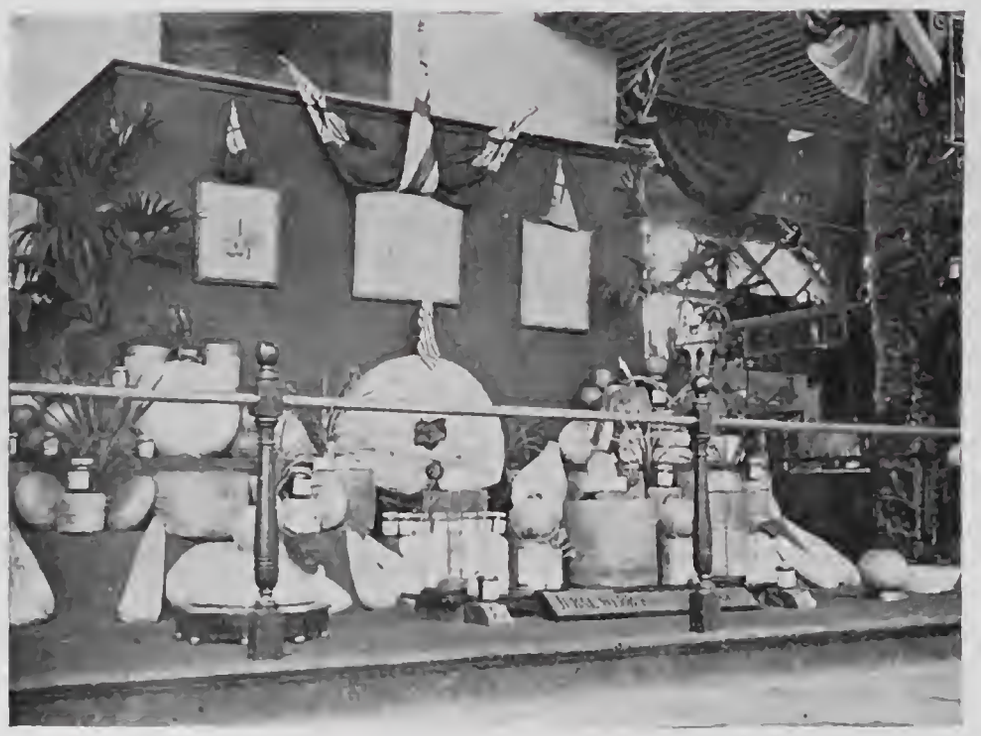
West of the New Mexican section is Montana's handsome pavilion, one of the most tasteful structures in Agricultural hall, and containing in its 200 or more exhibits an exhaustive representation of her products and

resources. Within is a pagoda fashioned of native grasses, and on a semicircular screen are presented the agricultural records of the state. As in other groups, cereals form the bulk of the specimens; but vegetables are also in good supply, with feed and fodder of many varieties, as blue-joint, blue-stem, bunch, and other grasses, clover of several descriptions, alfalfa, timothy, and red-top hay, and whatsoever else of grasses and hays is grown on Montana soil, its native herbage constituting a primary source of wealth. Though Montana is not an agricultural region, there are many sections well adapted to grain and other farming, with an average crop for 1892 of 33 bushels of wheat to the acre, 35 of barley, and 40 of oats, while on irrigated lands the average for all grain crops is nearly 42 bushels, and of vegetables 240 to the acre. Already there are some 250,000 acres of irrigated land in actual cultivation, and with the high prices of farm products, far above those of most of the Pacific states, Montana must cease to import, as now she does, a large proportion of her food supply.



CHEMICAL LABORATORY

Such are the agricultural products and resources of the Pacific slope, as represented at the Columbian Exposition, and here described somewhat at length as compared with other sections of the republic. As to the latter, most of my readers are doubtless well informed; but to many the choice and varied display of certain of the Pacific states will be almost in the nature of a revelation. In 1850 the cereal crop of the entire western coast could have been placed on board a single sea-going ship; in 1892 several hundred grain-laden vessels carried her surplus wheat and flour to a score of foreign ports. Yet in this region, covering nearly one-third of the total area of the United States, there is infinite room for further development.


ENGLISH CHEESE AND HAMS

In the south-western corner of Agricultural hall is the collective exhibit of agricultural colleges and experiment stations connected with or under the supervision of the government. Grouped along the outer walls of this section are specimens of plant life, models illustrating the development of the plough, articles contributed by women associated with the domestic and industrial departments, and various instruments used in ascertaining the properties of soil. Within are exhibits from manual training schools, and apparatus contributed by the laboratories. In the latter are ascertained many valuable facts relating to insects and parasites injurious to grains, fruits, and live-stock, with other matters that concern the agriculturist. Beyond are exhibits of grains and vegetables from various stations, some blighted, and others in a healthy condition.


BOVRIL BEEF EXHIBIT

One of the most practical results of the experiments conducted by this branch of the agricultural department, is that which shows the effect of feeding to live-stock different proportions of food elements. In a series of glass boxes are various grains, with layers of protein, carbohydrates, and fats, and beneath them are stated the several quantities required to produce ten pounds of additional weight in cattle, sheep, and swine. Experiments have also been made to ascertain what results would follow as to the production of fat or flesh, and beneath the vessels which show the proportion of food elements that entered into these constituents are represented sections of their bodies, with the distribution of fat and lean.

All the states have contributed to this collective exhibit, the Massachusetts college showing a collection of soils taken from different sections, accompanied by statements regarding chemical and mechanical analyses. The veterinary department of this college sends a model of a horse displaying its anatomy, and among the exhibits of the entomological section is the gypsy moth, with a story of its life, habits, and devastations. Plaster of paris specimens of Indian corn, parsnips, carrots, apples, pears, and potatoes occupy another case, samples being shown both of cultivated and wild varieties. In addition to these are charts with 3,000 figures, illustrating the systematic study of botany, and some ingenious apparatus for ascertaining the

pressure exerted by the flow of sap through trees. Near the exhibits of experiment stations is a large array of mounted Indian fowls, contributed by the New York branch, and illustrating various methods of feeding and of treatment.

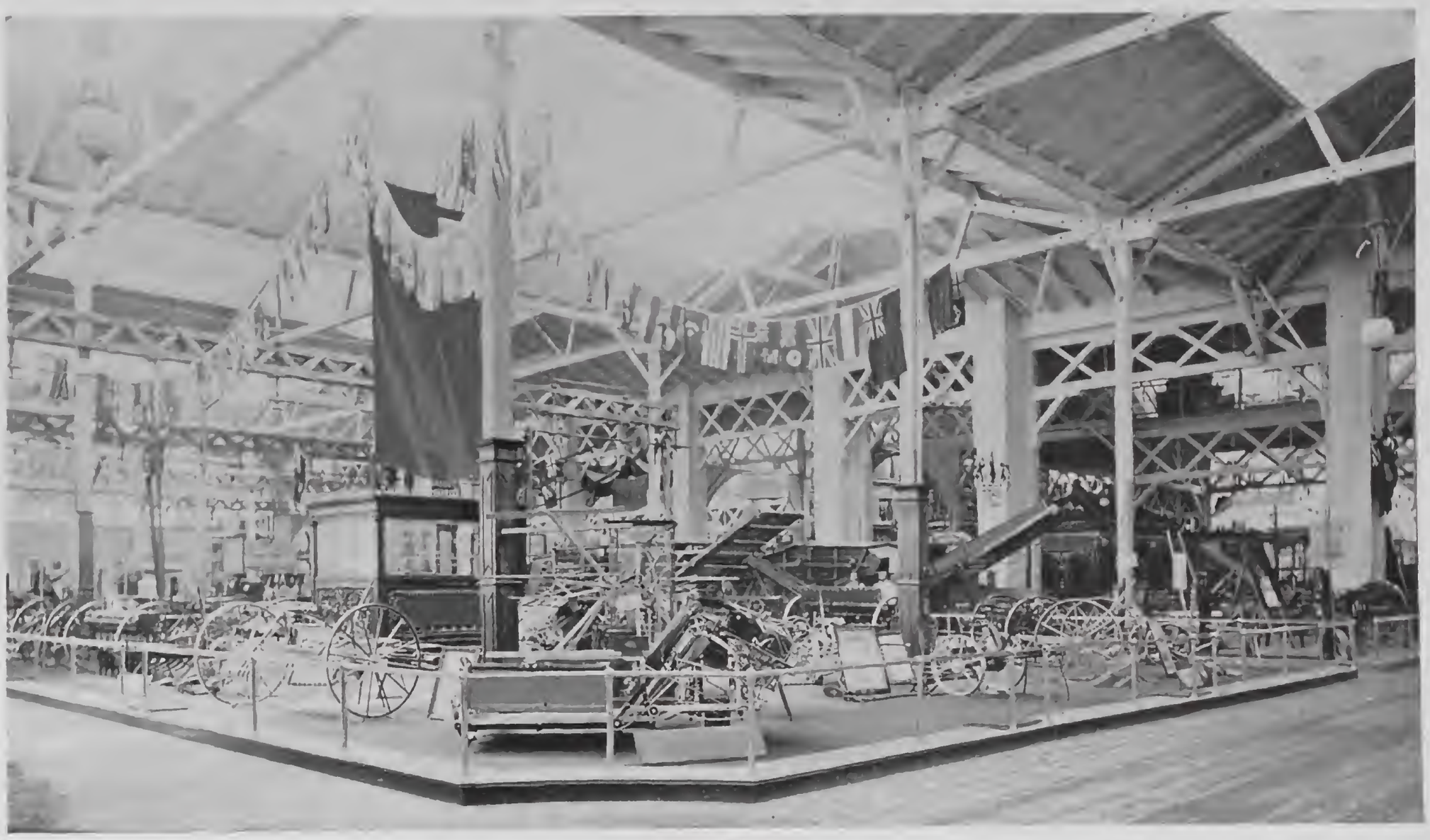
The entire display is neatly and systematically arranged, glass-covered cabinets, cases, and jars containing, not only farm products, but every form of life that pertains to farming in all its phases, including the care and breeding of live-stock. Here also is illustrated the botany of the farm, showing the seeds and plants best adapted to various locations, and when and where to place them, with many varieties of vegetables serving as food for man or beast. In the entomological section are cases of many-hued insects, some of them harmless, and others destructive to crops. Finally, it may be said that in this collective exhibit, almost hidden from view by the surrounding pavilions, is one of the most attractive features of the Agricultural department, one in which the colleges have given emphasis to the government display. The object of the former is to afford a scientific training, both practical and theoretical, in connection with the varied industries of the farm, to train their pupils in the elements of art, and to make of them useful citizens, whose hands are the ready instruments of thoughtful and cultured minds.



A GALLERY PAVILION

In cereal and other raw products Great Britain is somewhat feebly represented in her 12,000 feet of space in the Agricultural building, her exhibits comparing unfavorably with those of Canada, which ships to the mother country a large proportion of her wheat surplus. In England the acreage planted in grain, and especially in wheat, is steadily diminishing, the decrease in the latter exceeding 25 per cent for the decade ending with 1892. For that year the entire area in wheat was only 2,300,000 acres, or less than was planted in the single state of Indiana. In many of the American states the acreage and yield in cereals is larger than in the British isles, where little more than 9,000,000 acres are actually under cultivation, but with a larger proportionate surface devoted to hay and root crops. In average returns, however, the comparison is largely in favor of the latter, where of wheat the normal yield is 30 bushels, of barley 33, and of oats 40 bushels to the acre. These results are due largely to the more thorough and systematic farming, rendered necessary by the smaller size of holdings, which for the United Kingdom averages less than 50 acres, only a few hundred among the 1,500,000 landlords and farmers owning or renting more than 1,000 acres. Other causes are the rotation of crops, the fallowing of land for two or three years in succession, and the general use of fertilizers, of which more than 1,000,000 tons, nearly half of it imported at an annual cost of $6,000,000 or $7,000,000, aid in maintaining the fertility of the soil.

But with all his care and economy, the British grain-grower finds it no easy task to earn for himself a livelihood, so that many are turning their attention to root crops as yielding better returns, when taken in connection with stock-raising. In addition to hay, mangel-wurzel, turnips, and even cabbages are raised for winter feed, these being protected from frost, and mixed with dry fodder when distributed among the cattle sheds. Dairy farming is another prominent industry, and especially cheese-making, Stilton, Cheshire, and other



CANADIAN EXHIBIT

favorite kinds always holding their own in the market. Nevertheless Great Britain imports from Holland and elsewhere cheese to the annual value of $30,000,000, butter and margarine that cost her nearly thrice that sum, while of the total consumption of milk, and that which is made of milk, requiring nearly 3,000,000,000 gallons a year, little more than one-half is produced at home. Hop-raising is a favorite, and in good seasons a profitable pursuit, especially in the southern counties, the yield for 1892 exceeding 46,000,000 pounds; for the British are a beer-drinking people, consuming more than 30 gallons a year per capita of population. Add to this market-gardening and fruit-growing, both showing a steady gain in acreage and production, and it will be seen that there are branches of remunerative farming still open to the British husbandman.

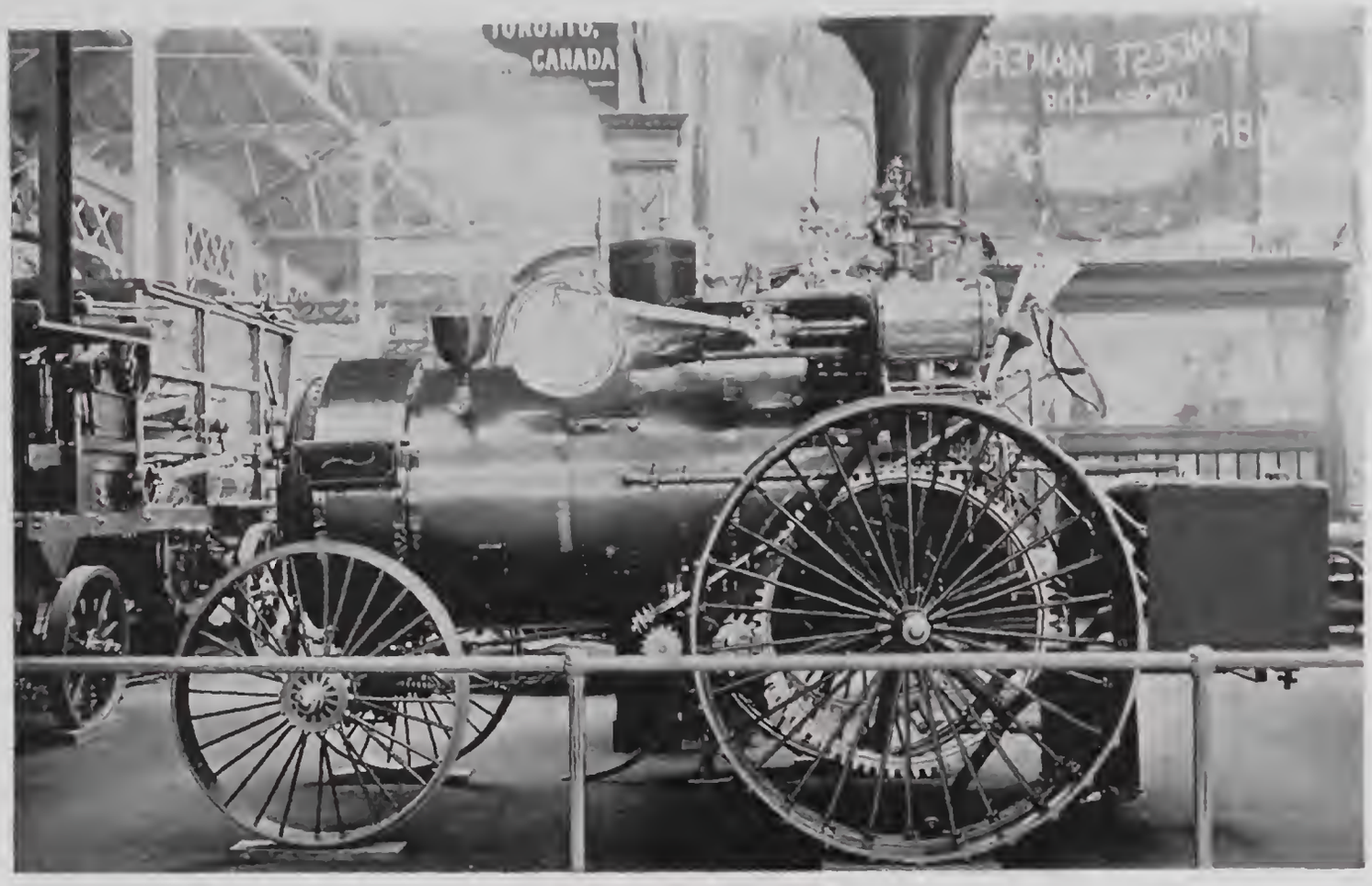
But while the outlook is not so dark as some would have us believe, it is nevertheless sufficiently gloomy; nor are the causes far to seek for this condition of affairs. First and chiefest among them are low prices, especially for grain, caused by over-production in the United States and India; these, with free trade, excessive taxation, complicated land laws, and the heavy toll demanded by railroads and middlemen, laying on the farmer a burden greater than he can bear. Thus it is that rents have gradually been reduced from twenty to fifty per cent, and in some localities, especially in Ireland, have almost reached the vanishing point, while there are large agricultural areas whose value has sunk to a level with that of the prairie lands of Iowa and Illinois. Though many remedies have been suggested, such as protection, bi-metallism, and the creation of peasant holdings, it is doubtful whether any or all of them would go far to mitigate an evil due almost entirely to low prices, one that can only be righted by increased consumption or diminished production.

From the agricultural experiment grounds of a Lancashire exhibitor are displayed samples of ears and grain, as the result of operations, extending over thirteen years, for improving, by careful selection and fertilization, the cereals of all the principal grain-growing countries in the world. Add to these a few specimens of wheat and oats from a Kentish farmer, one of them showing 76 ears, and some 4,500 grains as the product of a single kernel, and apart from a couple of oatmeal exhibits from Drogheda, Ireland, we include about all that England has to show us in the way of cereals. Dairy products are represented

HAPPY FAMILY, CANADA



CANADIAN GRAIN



TRACTION ENGINE, CANADA

by a single exhibit, and dairy appliances by a collection of churns, and other apparatus, the latter from the London and Provincial Dairy company. Of animal and vegetable fibres there is also but one collection, and that from an Irish company whose headquarters are at Belfast. Among fertilizers and fertilizing compounds are included nearly all the varieties used in Great Britain, as guano, ground bones, phosphates, sulphates, and other chemical preparations. Near them is an exhibit of eucalyptus oils and eucalyptus soap, the former in a dozen varieties as manufactured from various species of the gum-tree by a company whose works are in the Australian colony of Queensland.

Food preparations are better represented, as also are mineral waters, temperance beverages, and malt and spirituous liquors. From the British Bee-keepers' association comes an exhibit of 1,000 pounds of extracted honey, contributed by 100 apiarists, with books, pamphlets, and diagrams used by the society's lecturers and experts. By a coöperative organization are displayed samples of English, Scotch, and Irish honeys, with beeswax in various forms. In the same group is an exhibit of Queensland cane sugar, now largely produced in that country by Kanaka labor. Of tea, coffee, cocoa, and chocolate there are many varieties, and among the first is one from the Sylhet tea gardens in London, showing the plant in every stage of growth, as raised in that district of the Indian province of Assam. Preserved meats, soups, fish, fruits, and vegetables are in liberal supply, with combinations and concentrations for which special virtues are claimed, as those of the Bovril company, prepared from essences of beef, its exhibits housed in the most picturesque of booths, with office representing a fortress enthroned on a steep and rugged cliff. Of mineral waters there is a large array, and with them are many other drinks for the total abstainer, including such non-alcoholic preparations as hop bitters, fruit cordials, and orange champagne.

Except for a few samples of London gin and compounded spirits, whatever these latter may be, the samples of alcoholic liquors are limited to Scotch and Irish whiskeys, the former including the finest of Highland brands, and the latter the famous poteen which, in its purity, is one of the best of whiskeys, though for every gallon of the real article a hundred are sold under its name. Among these exhibits is a round tower, forty feet high, and constructed entirely of whiskeys in wood and bottle from a Dublin distillery. Allsopp's, Tennent's, and other favorite varieties of ale, porter, and stout are classed in a separate group. Of tobacco, an interesting display is that of the British North Borneo company, including leaf for wrappers, and cigars made entirely or in part from the products of its plantations. A similar exhibit is that of a company whose estates are in Sumatra, and a Birmingham company shows its appliances for rolling the leaf into coils or plugs, and for the making of cigarettes.

But the most attractive exhibit in the British section is a model of the Brookfield stud farm, at the foot of the Highgate hills, within a few miles of the most densely thronged of London's business centres. The stud is the property of W. Burdett-Coutts, whose "unearned increment" of wealth, with the influence that wealth commands, won him a seat as member of parliament for Westminster. Its purpose is to preserve and improve the old English breeds of coach-horses, hackneys, cobs, and ponies, some of which were in danger of becoming extinct. In the model are reproduced with remarkable fidelity of detail, all portions of the farm and stud, from the cottage of the groom, and the office where clerical work is done, to the covered yard, the clean well ventilated stables and loose boxes, the harness room, the riding-school, the granary and barn, and the show-ground with its wide expanse of turf.



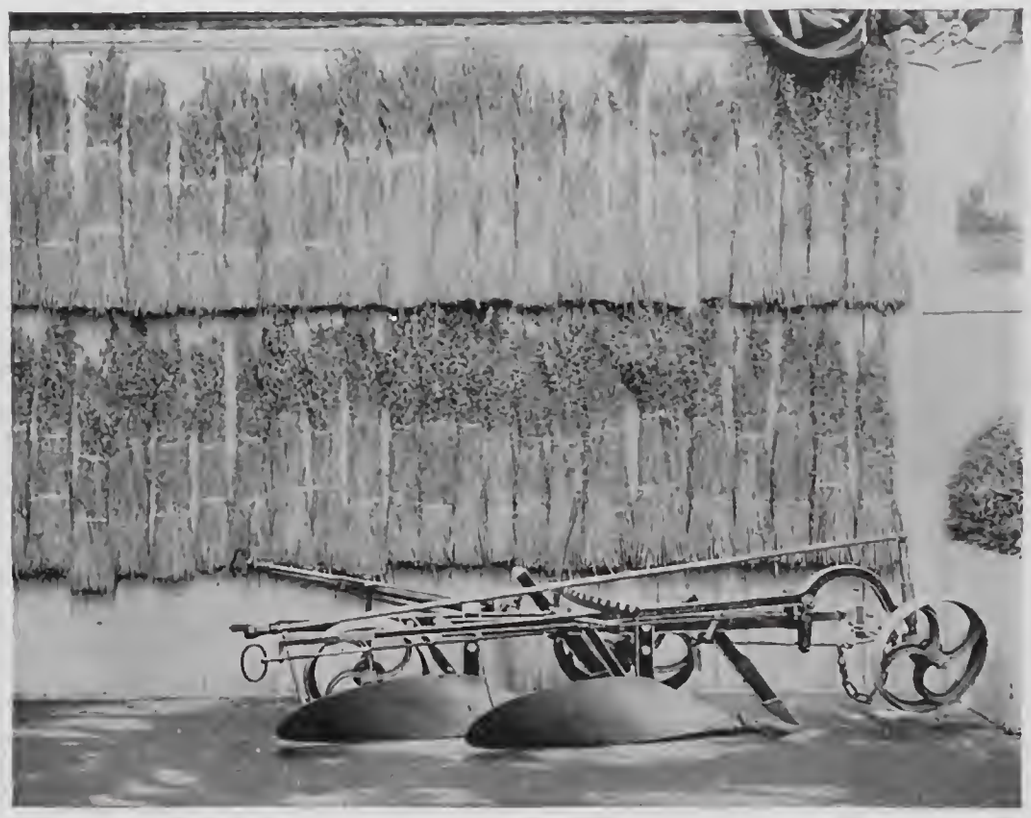
THE LARGEST CHEESE IN THE WORLD

There is also a collection of oil paintings by prominent artists, including those of the sire of Brookfield, and other famous hackneys.

East of the British section are the more compact exhibits of Canada, contained in three pavilions, one of them displaying the cereal, root, and other products of the government's experimental farm at Ottawa. There are also minor pavilions erected by the officials of the agricultural colleges of Ontario and Quebec, the latter structure in two portions, made of tobacco and grain. Near the enclosure which surrounds the government pavilions is a heterogeneous collection of articles, among them flour, starch, maple syrup, mineral waters, malt extracts, beers, and ales. Of cheeses, the making of which is a prominent Canadian industry, there is a sufficient display, and one of the chief attractions in this section is a monster cheese, encased in an iron tank, and mounted on a platform approached by a flight of stairs. On an inscription attached to the stand we are informed that it weighs 22,000 pounds, and that to supply the materials more than 1,600 maids milked 27,000 gallons from 10,000 cows. Manitoba, British Columbia, and the northwest provinces are all represented in the Canadian division, where are also mounted specimens of the white and black bear, of deer, goats, antelope, wild geese, and turkeys, with other illustrations of Canadian fauna.



ENTRANCE, NEW SOUTH WALES PAVILION



NEW SOUTH WALES CEREALS

In the annex is a collection of Canadian agricultural machinery, and as neither Great Britain nor any other of her dependencies have any exhibits of the kind, it represents the contribution of the entire empire in this department. The largest display is from a Toronto company, and includes binders, threshers, cultivators, mowers, and a Manitoba straw-burning engine. The last is used by agriculturists in regions where wood is scarce, and is fitted with a tubular boiler of peculiar construction, whereby a forced draft may be obtained. The cog-wheels are of aluminum, and connected with the thresher, which is supplied with an ingenious device for measuring the amount of grain that passes through it. The company's office is panelled with fifteen varieties of Canadian woods, such as are used in the construction of its machines, and included in its collection are the medals awarded at former expositions. In all some thirty firms have samples of agricultural implements, and among them are a few special apparatus, as pea harvesters and sap evaporators; but as for the most part one agricultural machine is very like another, when used for similar purposes, it is unnecessary here to describe them in detail.



CANNED GOODS, NEW SOUTH WALES

A feature in the Agricultural building, and one that has never been seen before, except at such local expositions as were held in Sydney and Melbourne, is an exhibit of the agricultural products of the Australian colonies, and especially from the oldest of her colonies, that of New South Wales. It is now some three centuries since a French navigator, landing on the western shore of the continent, found there, as he relates, a boundless expanse of forest primeval, with no signs of life nor anything that would support it, save for a few human and marsupial bipeds, the former so degraded that he hesitated whether or not to class them among the brute creation. But on this continent, with an area about equal to that of the United States, there is now a larger white population than on the entire



GRASSES AND FAT TAIL SHEEP, CAPE COLONY

Pacific coast, a contented and in the main a prosperous community, one that has built at least two cities larger than the Pacific coast metropolis, with many of smaller size. Among its sheep-farmers and stock-raisers are not a few who count their herds by tens of thousands, and their flocks by hundreds of thousands, the wool-clip of a single station, as the Australian terms his rancho, sufficing to load a clipper ship.

While not an agricultural country, in the proper sense



ANGORA GOAT AND SKINS, CAPE COLONY

of the word, Australia is more than self-supporting, producing of certain staples a much larger surplus for foreign markets than offsets the importation of others. Though wheat thrives badly on its thin, arid soil, an average crop represents a value of $30,000,000, and yet the average yield does not exceed seven or eight bushels to the acre. Of other cereals the product is worth some $25,000,000; of hay an equal amount; of root crops $20,000,000; of vineyards, orchards, and market gardens, $22,000,000, and of cane-sugar, $10,000,000, the last produced only in Queensland and New South Wales. Of wool the clip from 125,000,000 sheep, more than twice the number contained in the United States, was valued in 1892 at nearly $20,000,000, and of canned and frozen meats there is a considerable and steadily increasing export. In the latter department the colonies are encroaching somewhat on the American trade, for beef and mutton are worth less than half the prices paid for them in the eastern states. Such is the industrial condition of Australia, a country yet in its infancy, with a population of less than two to the square mile, but with resources which, until recent years, were not appreciated even by the Australians themselves.

Notwithstanding a serious depreciation in the price of wool, with little prospect of improvement so long as sheep continue to increase in two-fold ratio as compared with the human race, sheep-farming continues to be, as it ever has been, the greatest of Australian industries. And especially is this true of New South Wales, whose exports of wool for 1891 amounted to 332,000,000 pounds, valued at $56,000,000. As to the quality of this wool we have a complete illustration in the exhibits of the Australian section, forming the largest collection of the kind in Agricultural hall. In this collection there are no less than 400 bales, representing many varieties, from the soft merino fleece, prized for its purity and texture, to the coarser grades valued for quantity rather than quality of clip. At the entrance to one of the apartments is an arch constructed of solid bales of wool, and within or abutting on the aisles are pillars and pyramids of similar construction, with bins and cases filled with samples in bulk or fleece. There are also pictures of sheep and sheep stations, and as though standing ready to start on its journey of many hundreds of miles is a heavy wagon, laden with wool, more cumbersome even than the so-called prairie-schooners which bore across plain and mountain of America the argonauts of 1849.

In another apartment are the exhibits of cereals, flour, oils, and such as represent the tanneries and meat-preserving processes of New South Wales. Among them is an arch of corn cobs, artistically fashioned, and representing a prominent branch of colonial industry; for



GOATS AND SHEEP, CAPE COLONY



WINE, CAPE COLONY

maize thrives well on Australian soil, and is the only cereal that is largely raised for export. Here also are dried specimens of native grasses, such as are found on sheep and cattle ranges, with leaf tobacco, sugar-cane, and pyramids of food preparations and table delicacies. On the walls and pillars are large photographic views of public and other buildings in Sydney, and to the arch-ways of wool and corn is appended the Australian coat-of-arms, above it the colonial flag, on the field of which is the constellation of the southern cross.

Except for the exhibit of wool, Victoria, the smallest in size but the foremost of all the Australias in population and enterprise, has nothing worthy of mention, this not through indifference but on account of a severe financial depression, forbidding the appropriation of public funds. The collection of wools is from the Australian Sheep-breeders' association, and includes the choicest samples of the various grades in bale and fleece, with many fine and long wool varieties. In conclusion it may be said that the Australian exhibits, not only of agricultural specimens, but in the mining, fisheries, and other departments, display as they were never before displayed the varied products and the infinite resources and possibilities of the southern continent. Among these exhibits is much that is well worthy of being studied by American merchants and manufacturers, not merely as a matter of curiosity, but with a view to the enlargement of commercial intercourse. While our trade with Australia is of considerable amount, it is insignificant compared with what it should be, and the more so because the balance of trade is largely in favor of this country. New South Wales, for instance, sent us in 1891 more than $8,000,000 of her gold, and took from us in the same year goods to the value of more than $6,000,000, while shipping to this country little more than half that quantity of exports. While Australian merchants deal more largely with the United States than with any other foreign nation, their transactions are trifling in comparison with those of Canadian business men, who purchase in American markets nearly one-half of all that they require.

Small in size but of excellent quality, complete, compact, and in perfect taste, is the exhibit of Cape Colony, grouped in a glass pannelled enclosure decorated with banners and bannerets, its windows hung with ostrich eggs, and depicting the flora and scenery of southern Africa. On a revolving frame within is a choice collection of water colors, representing in natural size and hue the most beautiful and fragrant flowers and creepers, indigenous and exotic, among them some wonderful orchids and vines. In the decorative scheme is largely used a gray, silvery vine, which so far as is known grows only on Table mountain, near the foot of which lies Cape Town. Flanking the entrance ways are cases filled with ostrich plumes in their various shades of color, from those of grayish-brown, such as cover the back, to the soft, fleecy feathers, white as the driven snow, that are plucked from the tip of the wing. In the centre of the booth is a gigantic ostrich, and mounted on stands are two full-grown birds in all the glory of their plumage. In one of the cases, side by side with a large pyramid is a select assortment of eggs, some polished, and others painted in various designs.



NEW ZEALAND HEMP



OSTRICH EGGS, CAPE COLONY

Of other birds the collection is remarkable for variety of species, and brilliancy of plumage. Fish are represented in water colors, their scales displaying all the brilliant hues of semi-tropic climes. In the centre of the booth are mounted specimens of animals, showing the highest art of the taxidermist. Among them is an Angora goat, with its silky coating of hair, a fat-tailed sheep, whose unwieldy appendage is esteemed by Kaffirs a delicacy, and a so-called Boer goat, whose hair and carcase are worthless, and whose mission in life is to guide homeward the flocks at nightfall. Elsewhere are specimens of furs and pelts, with rugs fashioned from the skins of the golden jackal and



GRAIN AND GRASSES, FRENCH EXHIBIT

the spotted tiger. Of tusks there is a fair collection, including what is said to be the largest elephant's tusk in existence, more than seven feet long, and weighing nearly 160 pounds.

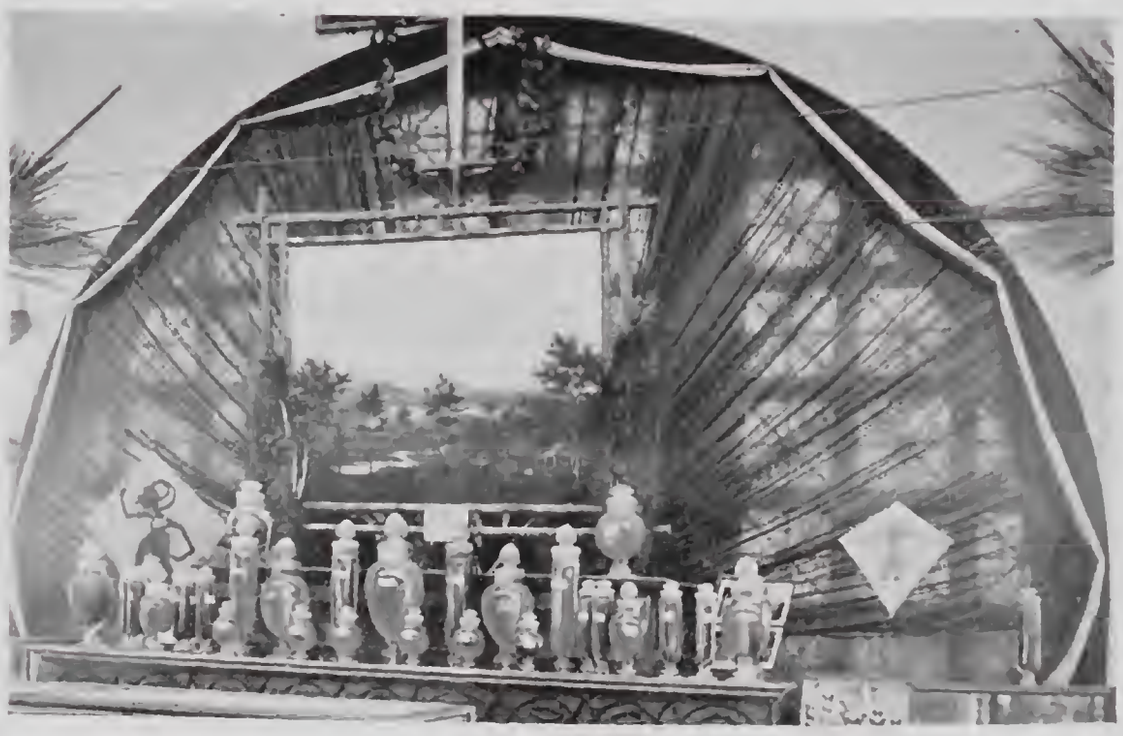
Of wool and mohair there is a plentiful display, the latter selling in the London market at thirty-five cents a pound, and comparing favorably with Turkish and other growths except for length of staple. Though a comparatively recent industry, exports of mohair for 1891 amounted to some 10,000,000 pounds, while those of wool for the same year exceeded 75,000,000 pounds. Cape wines and brandies are arranged in the form of a pyramid, and side by side with bush or native tea is tobacco, cured and in the leaf. Of cereals there is a small display, but one of superior quality, including samples of wheat that weighs nearly seventy pounds to the bushel. There are also the buchu leaves, used for medicinal purposes, with native grasses, gum-arabic, and dye and other woods of many descriptions.

Of miscellaneous articles there is an interesting assortment, including Kaffir, Zulu, and other weapons, implements, and curios, among them the assegai, thrown by the African bushmen with unerring aim, and which in the Zulu war dealt his death-blow to the prince imperial, son of Napoleon III. There are also the insignia of chieftaincy, including a curious cloak made of strands of twisted fur, such as is worn by a chieftain's wife on state occasions.

North of the Australian section, and adjoining the rotunda of Agricultural hall, is the pavilion of Ceylon, with pillars of ebony and wood-work elaborately carved. Tea forms the principal display, and those who are so inclined may test the quality of the brew, as prepared and served by native attendants. There is a model of a tea plantation, and in diagram form is shown a thirty years' record of Ceylonese exports to Great Britain, where most of the surplus teas are marketed. Other exhibits are native woods; cinchona, or, as it is more commonly termed, Peruvian bark; desiccated cocoa-nut, and the products of cocoa-nut



CORK EXHIBIT, ALGERIA



JAVANESE EXHIBIT

fibre, as in mattings, ropes, and basket-work, these with a few skins, a case of plumbago, an irrigating machine, and a small collection of agricultural implements, including about all that Ceylon has to show us in this department.

In France about one-half of the entire population depends on agriculture for a livelihood, the number of proprietary and tenant farmers amounting to nearly 4,500,000, the majority



GERMAN SECTION

effort, the $200,000,000 of her war indemnity, to sink nearly twice that amount in the Panama canal project, and pay as interest and sinking fund some $260,000,000 on her $6,500,000,000 of national debt.

France and her colonies occupy sections in the annex, and the western and eastern portions of the main building, the exhibit of the government being installed between that of Russia and the United States. This consists largely of maps and charts, showing the location of vineyards, agricultural districts, and national schools of agriculture, with such statistical tables as represent the fluctuations in the prices of bread and breadstuffs throughout the republic from 1830 to 1891, and of meats and all agricultural products during the seventeenth and eighteenth centuries. The results of various experiments in the government laboratories are also given, and there is a model of the testing field, connected with the government seed house, with photographs illustrating the province of the French agricultural department, especially in sugar-beet culture, as conducted at the government farm at Grignon. In addition to these are models and programmes of the primary agricultural schools, with their methods of education fully explained.

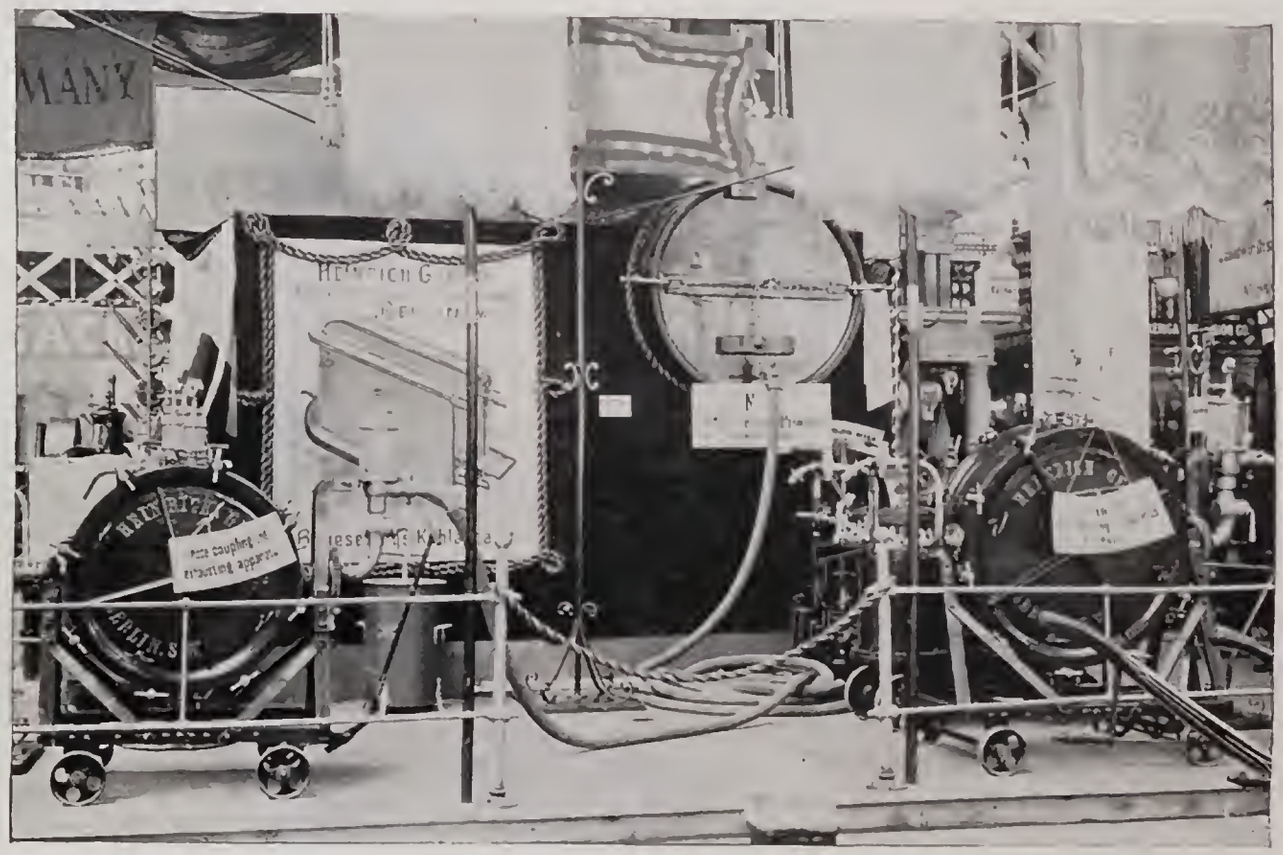
Fronting on the eastern extremity of the central transverse nave are displayed the products of French farms, including food preparations. Grains and vegetables are arranged along the walls, with seeds and colored illustrations in the centre. Elsewhere are barrels of flour, glass cases filled with refined sugars, canned vegetables, fruits, and nuts, salad oils, liqueurs, and delicacies in solid and liquid form.

In the French pavilion the main attraction is a rectangular structure, about thirty feet long, and half that width and height, with an arched door-way in the centre composed entirely of small papers of chocolate manufactured by a Parisian house, and representing the daily output of 50 tons, valued at $40,000. In the



BREWING PROCESS, GERMANY

belonging to the former class, with about an equal number of laborers and domestics. Add to these the wives and families of agriculturists, many of whom share in the work of the farm, and we have a total of some 19,000,000 persons supported by this industry. Partly through the agency of the law which requires the father to bequeath his property in equal shares among his children, the subdivision of farms has here been carried to an extreme. Nevertheless France still imports largely of cereals, the total of her average crop not exceeding 40,000,000 bushels a year. Nowhere are better understood the advantages of diversity of farming, and nowhere are the agricultural classes more frugal and industrious. Largely through their contributions France has been enabled to pay almost without apparent



GERMAN BEER FILTERING APPARATUS



APOLLINARIS WATER, GERMANY



GRAND BASIN AND COURT OF HONOR

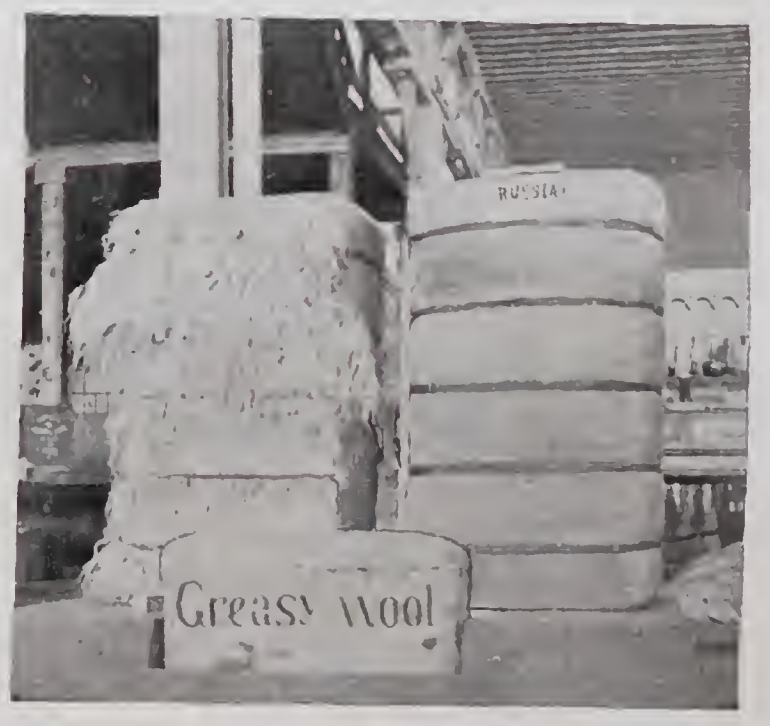


RUSSIAN GRAIN EXHIBIT

annex is a display of distillery apparatus, and a large portion of the space is occupied by a model barn, with granaries, stalls for live-stock, and other farm buildings enclosing a central yard.

In an adjacent section to the north of the pavilion the French colony of Algeria displays her products, the main exhibit consisting of cork in many varieties. The principal entrance to the Algerian edifice is framed with slabs of cork; within is the tree itself, and there are many carvings of superior design and execution. The rough bark is exhibited in bales, and sheets of cork are shown for use in the linings of hats, and the insoles of shoes. The entire collection represents an industry which is making rapid headway, if we can believe the statement here contained, that in this colony more than a million acres are covered with young cork-trees, not yet in bearing.

Cordage is also a leading Algerian product, many of the specimens here displayed being made from the native grass known as alfa. A mass of silk cocoons attached to the branches of a mulberry tree points to another prominent industry, as also the cases in this vicinity containing such products as olive oils, nuts, dried figs, grains, and cigarettes. Across the aisle from the main section is a tasteful structure containing a central court cooled by a beautiful fountain, its enclosing arches and floor in imitation of marble, and its walls hung with Moorish tapestries. This is a reproduction of an apartment in the palace of the Algerian governor, and adjoining it is the office of the colonial commissioner, with collections of native woods bound in the shape of volumes, a carved and inlaid cabinet, specimens of needle-work, tobacco, and minerals, and typical illustrations by native artists.



WOOL IN THE GREASE, RUSSIA

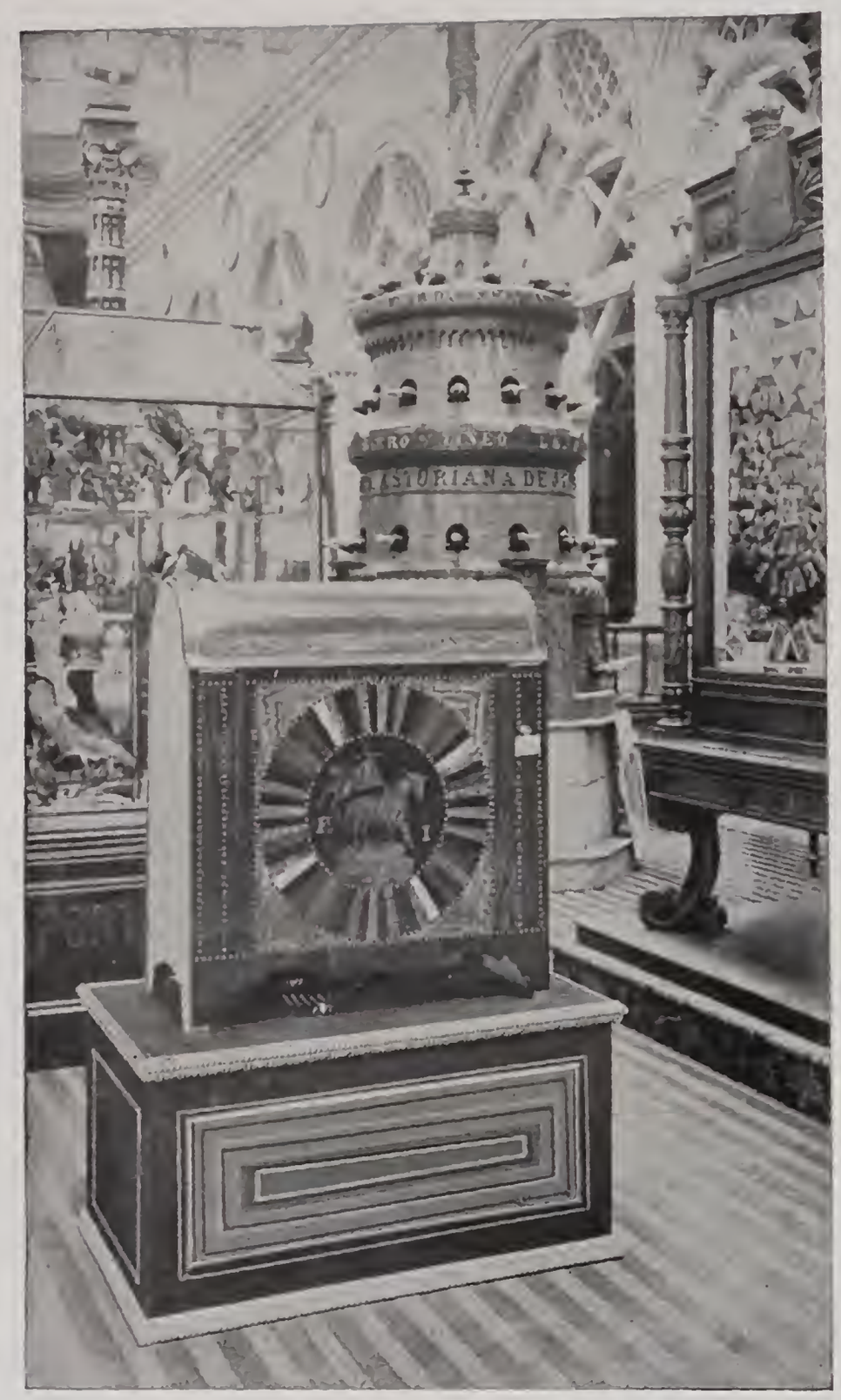
In Germany more than one-third of her 50,000,000 inhabitants are supported by agriculture, the total number exceeding 19,000,000, of whom nearly one-half are actual farmers or farm laborers. About fifty per cent of the entire area of the German empire is classed as arable lands, of which there are 65,000,000 acres, a goodly surface in truth, but less than is contained in a couple of our western states. As in France, agricultural lands are here minutely subdivided, with 2,500,000 farms of less than two and a half acres, and perhaps an equal number below 25 acres, while of those above 250 acres there are less than 25,000. Even the smallest of these holdings include a certain percentage of meadow and cultivated pasture lands; yet each of them suffices for the support of a family. But with his careful and laborious husbandry, the German turns his land to the best account, raising of wheat an average crop of nearly 50 bushels an acre, with other cereals in proportion, while of potatoes the yield is five times as large, far surpassing that of Ireland, the "land of potatoes and poteen." In Austria and Hungary considerably more than one-half the population is maintained directly or indirectly by agricultural pursuits, which, especially in the latter country, are rewarded by excellent returns.



THE DANISH PAVILION

The German and Austrian groups, the former by far the more interesting and extensive, are separated from the British section by the main longitudinal nave. In the latter the most noticeable feature is that which represents the mineral waters of Austria, an exhibitor from the neighborhood of Carlsbad displaying a huge metallic bottle at whose base is a number of the vessels used in the trade. Hops, barley, and seeds, wax and waxen goods, are also on exposition, with powders for the destruction of insects, and appliances and publications relating to the several industries of the apiarist.

In the German section, are two main centres of interest, ranking indeed among the most attractive features in Agricultural hall. The first of these is the pavilion of the Stollwerck brothers of Cologne, fashioned of chocolate and



PORTO RICO EXHIBIT

in the form of a temple of the renaissance period. It is 38 feet in height, and in its construction were used 30,000 pounds of chocolate and cocoa butter, the latter giving to the structure the semblance of marble. Blocks of chocolate form the foundation, upon which rest fluted columns crowned, above the architrave, by the emblematic eagles of Germany, and surmounted by a dome, with the imperial crown as apex. In the midst of the temple is a heroic statue of Germania, modelled after the figure on the Niederwald monument, and sculptured from a solid mass of chocolate. On its pedestal are reliefs, more than life size, of the emperors William I, Frederick III, William II, Bismarck, Von Moltke, and other historic characters.

The other exhibit to which reference is made is also in the shape of a temple, its court containing an exposition of the industries which centre in a Strassfurt establishment for the mining of salt and potash deposits, and their manufacture into fertilizers. This is known as the German kali works, a large stand in the centre of the court showing samples of the deposits as mined and prepared for the use of agriculturists, while from a broad platform depend a number of charts explaining the composition of the product, and its uses in supplying potash, phosphoric acid, and nitrogen for impoverished soils. A series of photographs also shows the visitor the large works connected with this enterprise at Cologne, with their mines, manufacturing departments, and laboratories.

In the German section are also displays of many varieties of prepared food and drinks, several firms making a specialty of food preparations for infants. As in the Austrian section, mineral waters, cordials, and liqueurs, to say nothing of beers and malt extracts, are in liberal display. The proprietors of some thirty German resorts, at which are famous springs or baths, have a collective exhibit of their waters in a pavilion adorned with statuary, and provided with settees and easy chairs for invalids, and others seeking information. Baden-Baden, through its city committee on baths, presents views of that well known resort, with plans of its new bathing establishment. The royal Prussian bath at Ems, the cold and the hot sea water baths of Heligoland, the royal Bavarian baths, and the Harzburg Springs company, purveyors to the dukes of Edinburg and Saxe-Coburg-Gotha, with other noted sanatoria are also represented. In the northwestern portion of the annex are the exhibits of machinery for the treatment of mineral waters, with refrigerators and the apparatus used in breweries and distilleries. Such agricultural appliances as ploughs, scythes, potato-harvesters, and threshing machines, with fertilizers of various descriptions are also on exposition.



MEXICAN WHEAT



MEXICAN TOBACCO AND LIQUORS

Russia's exhibit, west of the French government section, demonstrates the varied resources of her vast empire in the form of structures of flax, tow, and hemp from the Caspian region, raw silk and tobacco from her Transcaucasian domain, and grains of all kinds from her central and southern provinces of Europe. Wheat and oats are displayed in sheaves, and threshed grain in vessels fashioned in imitation of bronze, a large collection of the latter arranged in the form of a lofty tower. The manufacture of candles is a flourishing industry in Russia, the largest and those of most elaborate design being used in the ceremonials of the church, of which some fine



HENEQUIN PLANT, MEXICO



IN THE BRAZILIAN SECTION

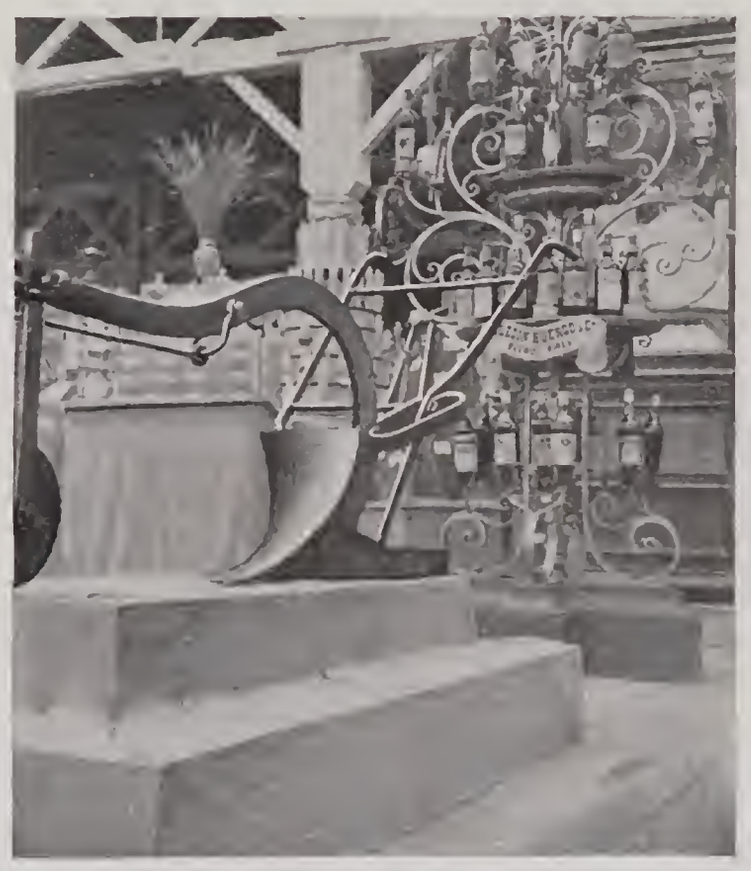
specimens are here on exposition, arranged in structural forms. There are several imperial factories for the refining of sugar from beets, all of which have samples of their products, the government of Kieff adding to this collection specimens of honeycomb and confectionery.

Of more than 1,000,000,000 acres of arable land contained in European Russia, at least 60 per cent is under crop, the total yield of all cereals for 1892 amounting to 1,700,000,000 bushels against nearly 3,000,000,000 for the United States. Within recent years nearly 7,000,000 of emancipated serfs have redeemed or paid for their land in labor or kind with government aid, the average holding of the peasantry not exceeding ten acres per capita. Erelong the most favorable outlet for the poorer class of agriculturists will be in central and southern Siberia, a region whose resources are as yet but little appreciated, though gaining in favor as the railroad, now approaching its eastern verge, lays open to settlement its vast and virgin expanse. What the western and Pacific states were to our own republic, that will Siberia become to the Russian empire at no very distant day.

Italy occupies a small rectangular section in the south-western portion of the main hall, adjacent to that of the agricultural colleges and experiment stations. Her display is of a somewhat miscellaneous character, including a large collection of olive oils and food preparations, as pastes, almond, and honey cakes, macaroni and cheese, chocolate, sugar, spices, sweetmeats, and liqueurs, with a few specimens of flax and hemp. Silk, one of her leading industries, with nearly 100,000,000 cocoons, gathered yearly from more than 5,000 cantons, and with 200,000 women and children employed in the treatment and manufacture of silk, is here represented by a single exhibit of larvæ. In line with the Italian group, but at the opposite side of the hall, and adjacent to the Virginia section, Greece shows her raw silks and olive oils, from various localities, with specimens of honey and honey-comb such as Attica produced long before Homer bethought him of the



COTTON, BRAZIL



INTERIOR, ARGENTINIAN SECTION



COLUMBUS ARCH PERISTYLE

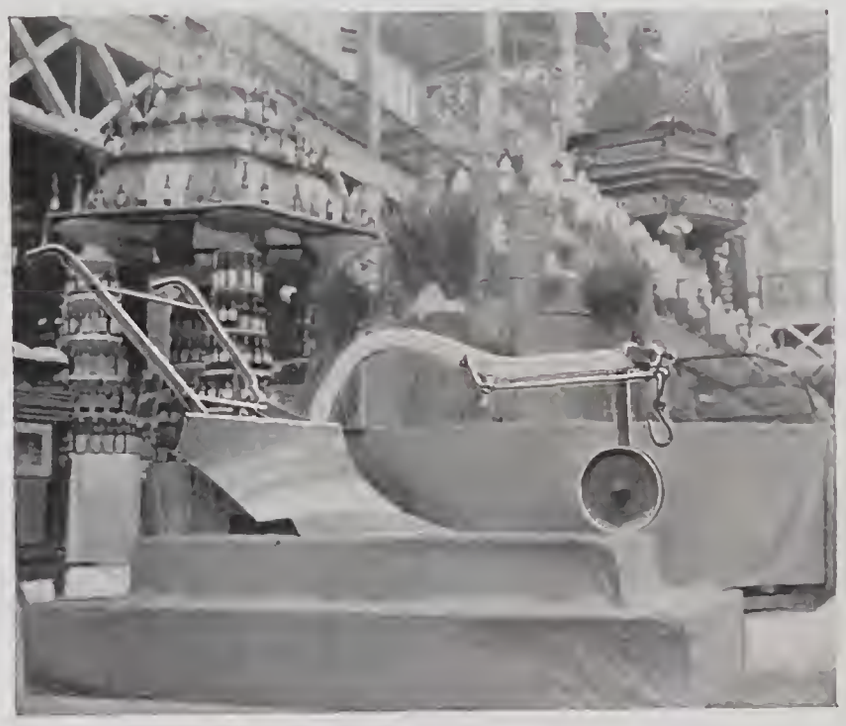
famous simile in which the Grecian hosts are likened to a swarm of bees covering the plains of Troy.

Holland, Sweden, and Denmark are grouped together in the northeastern portion of the hall, an Amsterdam chocolate house monopolizing most of the space allotted to the Netherlands. In its booth are dummies of life-like appearance, representing women and children about to receive their favorite beverage from the hands of a waiting maid. Somewhat of a curiosity is the Java kapok, a fibre used for bed-filling, and for which are claimed the advantages of remarkable elasticity and lightness.

Sweden illustrates her paper manufactures from wood pulp in the form of a small pavilion within her section, its base composed



MOUNTAIN HUT, BRAZIL



ARGENTINIAN WINES AND GRAINS

of segments of the trees generally used for the purpose, a large twisted column representing the finished product. Next to paper, Swedish punches, including such as are made of arrack, are the most prominent exhibits, while in the adjoining Danish collection the display of butter and a milking machine whose workings are illustrated on a model cow, are features not to be overlooked. In the latter is a booth filled with chocolate from a Copenhagen factory appointed as royal purveyor, and containing busts of the king of Denmark made of that article. The main entrance to the Danish pavilion represents a farmhouse, with high thatched roofs and broad gables, and with national types of women and pastoral scenes depicted on panels in the outer walls.

Spain and the Philippine islands jointly occupy a pavilion west of the main northern portal. The exhibits of the former include summer, red, and winter wheat, with other grains, of which some are prepared for use in various forms. There are also preparations of food and drink, as soup, pastes, arrow-root, tapioca, confections, honey, and chocolate. Of alcoholic, vinous, mineral, and other beverages there are many samples, and in the group of olive oils are 100 specimens. Of wool there are a few assortments, and in the form of a hut are the fibres peculiar to



SOUTH AMERICAN PRODUCTS



BRAZILIAN BASKETS AND SILK COCOONS

the Philippine islands. Porto Rico sends an assortment of coffees, sugars, tobaccos, cigars, native woods, and curios. Near by is the booth of Trinidad, some of whose exhibits duplicate those of Porto Rico, but contain also collections of birds, with special native products and curiosities.



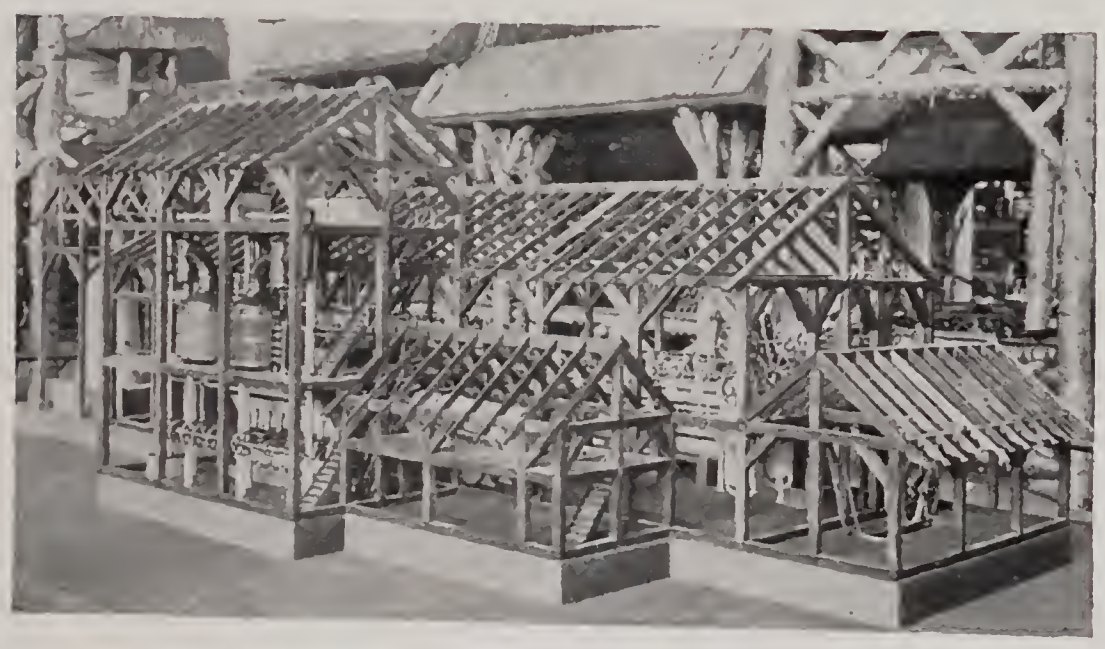
PARAGUAYAN EXHIBITS



ALLIGATOR AND SNAKE SKINS, PARAGUAY

In the Cuban pavilion, the bulk of the exhibits consists of tobacco in leaf, or in the form of cigars, and sugars of various grades manufactured from the cane. Upon the wall are statements from chambers of commerce as to the production of these staples, and also of Cuban minerals.

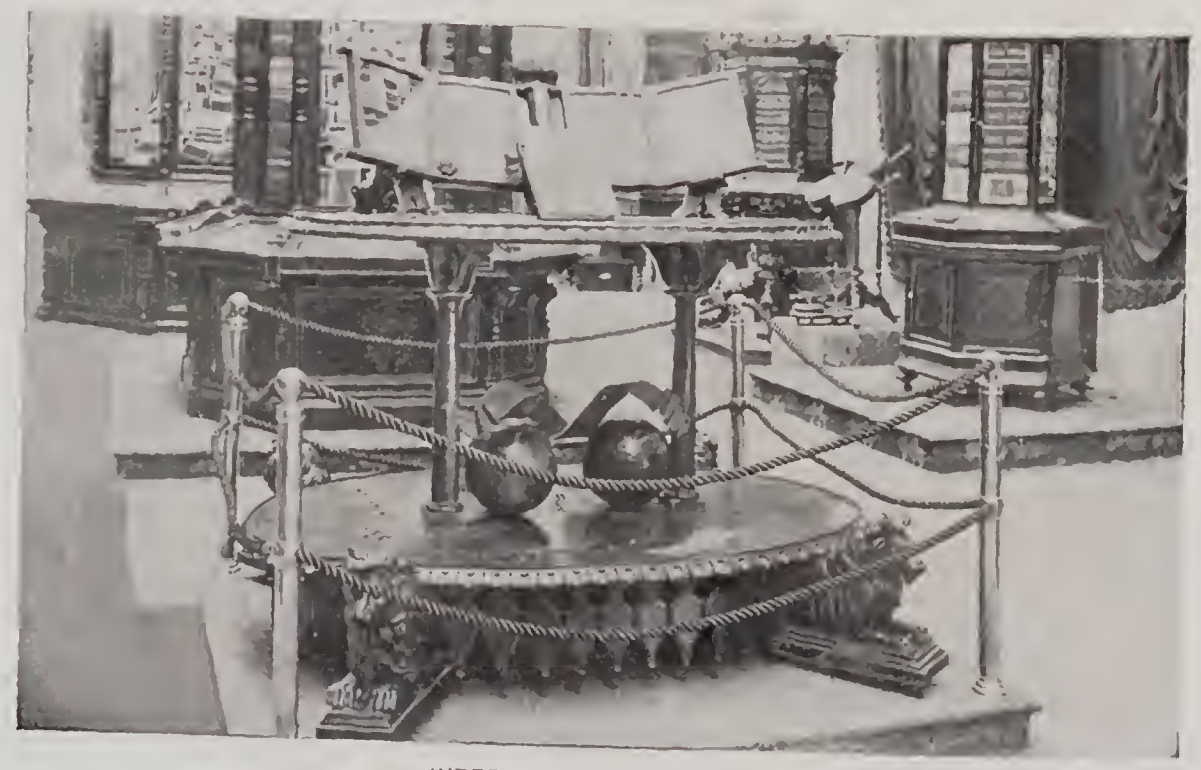
Prominent among the exhibits of Latin-American countries are those of the Mexican section, and especially as to their collections of tobacco, fibres, and grains. Side by side with cigars and cigarettes is the raw material in leaves of phenomenal growth, while the fibres of the maguey plant are heaped in and around a huge central basin, and appear elsewhere in the form of rope, matting, and cloth. Some 2,000 varieties of seeds, spices, and grains are here on exposition, and there is a fair collection of the sheath-like fruit of the vanilla. Sugar made from the cane, and soap from cotton seed oil, represent important branches of industry, and there are specimens of wild cotton indigenous to Mexico. Samples of native drinks are plentiful, including pulque and other liquors extracted from native plants, with such as are made from the orange, lemon, apple, pear, and peach.



SUGAR MILL, CUBA

Richly decorated in green and gold is the pavilion of Brazil, with its attractive and varied display. Noticeable among the exhibits are pyramids of wool and tobacco, and a hut constructed of sections of fibrous plants, with hats of the same material arranged in the shape of festoons. There are also in various grades and forms coffee, sugar, silk, grasses, and manufactures of native fibres, with Brazilian wines and other beverages.

The Argentine republic gives prominence to her stock-raising industries. Wool in the fleece and other forms is everywhere in this pavilion, one of the walls of which is almost covered with tanned hides and pelts. Of wines, sugars, and tobacco there is also a creditable display. Paraguay shows her medicinal plants outside of her section. Within are several samples of native tea, which there takes the place of the Chinese product, and is largely exported to other countries. Though not suited to American palates, it is a less injurious beverage than most of the varieties that Japan and China send forth. The exhibit indicates that Paraguay intends to make herself known as a tobacco-growing country. Here also is the cassava, or manioc



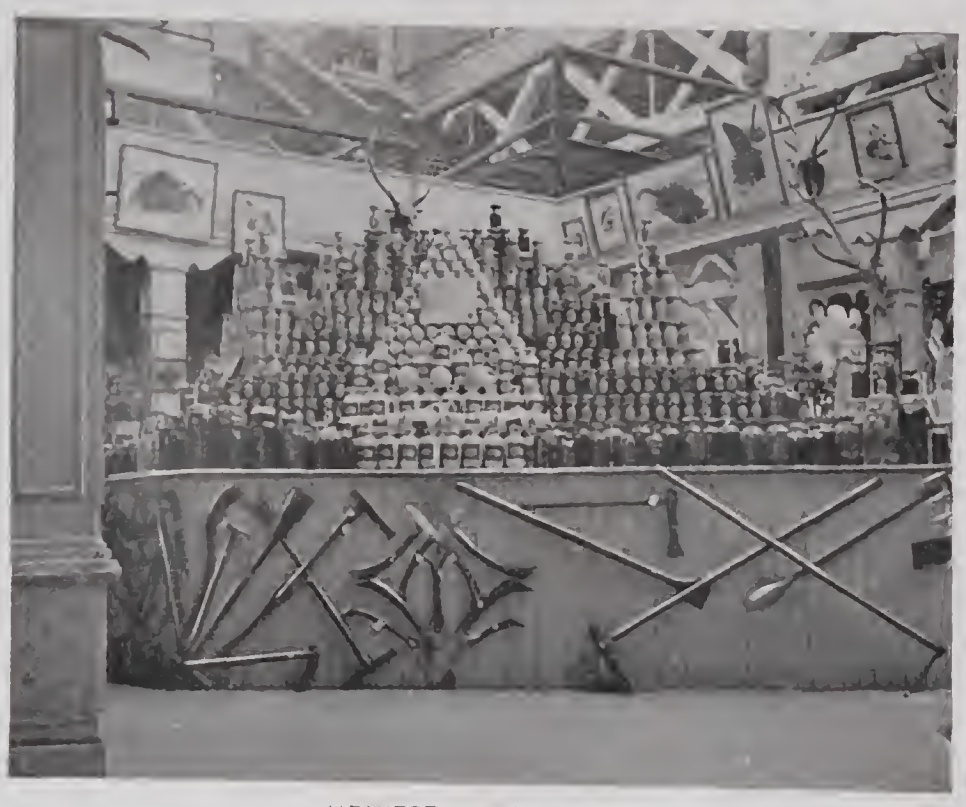
INTERIOR CUBAN EXHIBIT



JAPANESE PAVILION

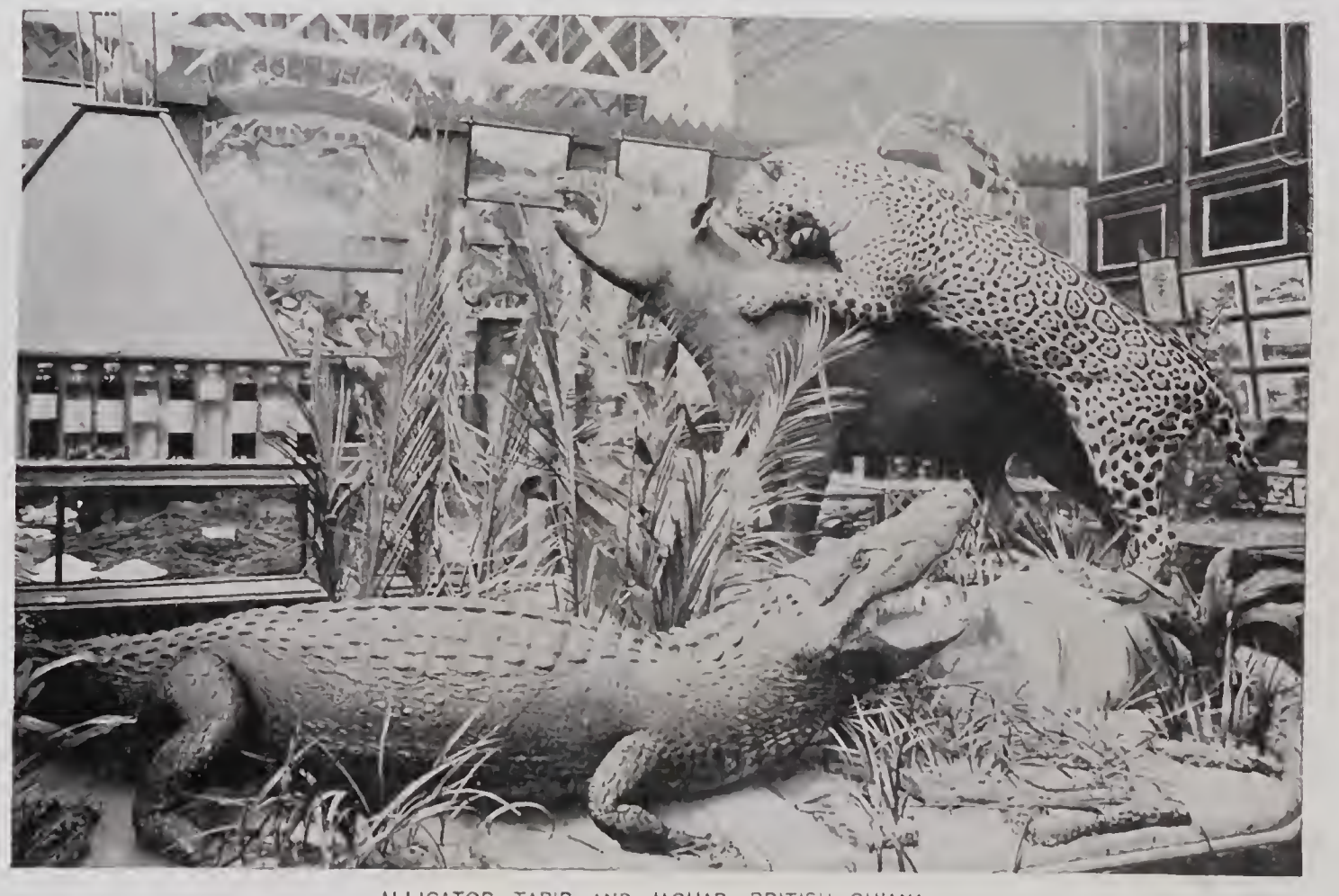
root, from which tapioca is prepared. As this is a collective display, it includes articles of pottery, carved wood, canes made of native trees, laces, and other illustrations of industries and resources.

On the panels of Ecuador's miniature pavilion are depicted the governor's palace at Quito, and scenes typical of the republic. The exhibits include tapestries, porcelain, paintings, and wood and ivory carvings, the last of excellent workmanship. A model of a human skull, carved from wood, and skilfully colored, is a remarkable specimen of imitative work. Among manufactured articles—for this is also a collective display—may be mentioned boots and shoes, saddlery, hats, clothing, and tinware. There is a small collection of native woods, and curios and relics are plentiful, including a few primitive agricultural implements, and costumes of Indians.



JAPANESE CANNED GOODS

In the northeastern portion of Agricultural hall, Uruguay has an ambitious display, representing many branches of her industries and arts. In the centre of her pavilion is a column of dark wood, erected by the Liebig Extract of Beef company, whose works and yards at Fray-Bentos are probably the largest industrial establishment in South America. Around it are bottles of the extract, and photographs of the factory and grounds, with specimens of candles and soaps in a case adjacent. Elsewhere are fleeces and piles of long silky wool, with all the grains of the temperate zone, with liqueurs and mineral waters, minerals and woods, and collections of paintings, books, and specimens of work from pupils of the public schools. Among the pictures, one of the most remarkable represents a young mother, drawing aside the coverlet from a sleeping infant, her hand upraised in a gesture of warning. The educational exhibits abound in specimens of kindergarten work, and there are many illustrations of proficiency from pupils of the higher schools, conducted jointly by the government and the catholic church.



ALLIGATOR, TAPIR, AND JAGUAR, BRITISH GUIANA

South of the Mexican section is the Japanese pavilion of bamboo and matting, its outer walls adorned with green panels of the latter material. The exhibits of tea, with photographs illustrating the methods of picking and packing, are of special interest to the people of the United States, who consume so large proportion of this product. Jars and boxes of rice and vermicelli, leaf tobacco and cigars, wax made from berries as well as the more common kind, plantain fibre, hemp, and matting are also on exposition. There is a large assortment of cocoons, and among other curiosities are gourds made of snake skins. Brandy manufactured from rice, beers and vinegars, fish sauces, and other condiments and beverages, some of them peculiar to the country, are arranged side by side with canned salmon, trout, beef, lobsters, oysters, and sardines.



ANT EATER, BRITISH GUIANA

An attractive feature is the collection of birds and fowls, including such as are found in forest and on farm, and those which are used for food. Among them are bantams and Siamese chickens, and mounted on high in a coop is a pair of long-tailed fowls, one of which has an appendage more than ten feet in length. In the pictures scattered throughout the pavilion are illustrated tea plantations and processes, together with many ingenious devices whereby the Japanese ensnare the birds of forest, field, river, and lake. These include decoy birds hung in cages, nets attached to long bamboo poles, and limed ropes stretched over the water, all of which are represented in graphic art.

British Guiana and Curacoa, the latter a small colony of the Dutch West Indies, have small adjoining exhibits in the northwestern corner of the hall, in which are brought together many forms



STORK AND ANT EATER, BRITISH GUIANA

of wild and civilized life. A case in the latter section contains the antiquities of Carib tribes, and near it is a burial urn of clay. Among other curiosities are samples of shell and feather-work, whose bright colors stand forth in strong relief.

British Guiana has a more elaborate display, as befits her resources and commercial importance. Birds of brilliant plumage, crabs, turtles, sword-fish, a sea cow, an alligator, a so-called bear howler,

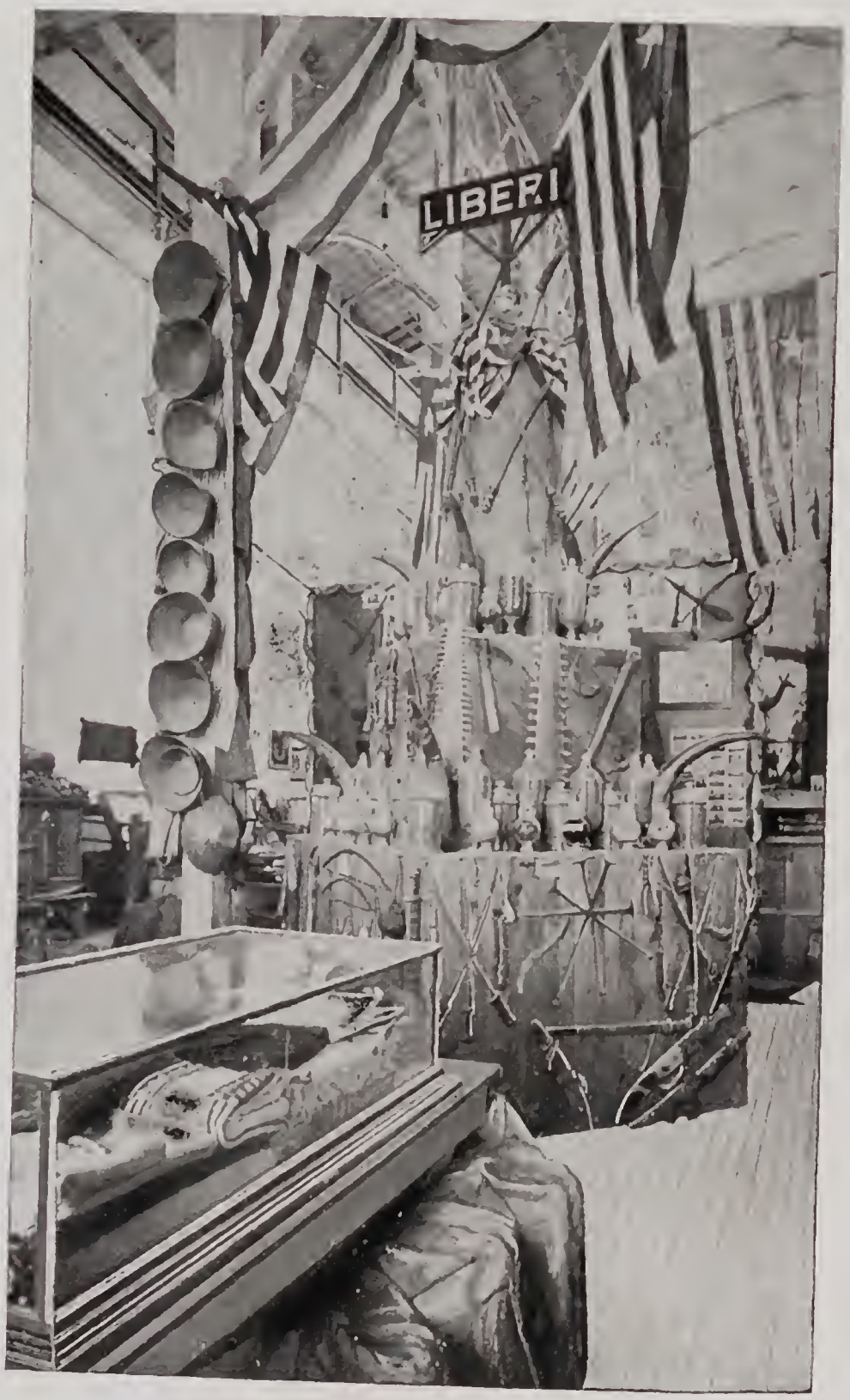


MONKEYS, BRITISH GUIANA

whose roar is out of all proportion to its size, with ant-eaters, deer, squirrels, raccoons, armadillos, opossums, and in the centre of the pavilion, a jaguar perched on the shoulder of a tapir, illustrate the animal life of forest and water. Another illustration of forest life is presented in the highly polished sections of native woods arranged around the structure, unfinished logs serving as pillars and beams. Thus are exhibited more than 100 specimens suitable for ship building, railroad ties, cabinet work, and other purposes. A series of pyramids, gradually rising in height, and increasing in size, illustrates the progress



SLAVES IN COSTUME, CURACOA



LIBERIAN SECTION

SIAMESE PAVILION

in the production of gold from 1884, when the entire yield was but 250 ounces, to 1892, when the export was nearly one hundred times as much.

Johore, in the southern extremity of the Malay peninsula, has a tasteful pavilion between the Brazilian and Mexican sections. From the main entrance floats the star and crescent, and near it, within the booth, is a large bust of the sultan, with photographs of his palace, and the scenery of his dominion. On one side are specimens of printing from the imperial establishment at Singapore, and on the other, books and charts from the native schools, with a heavy wooden block to which the rebellious pupil is chained. The exhibits include samples of coffee, tea, copal, rice, sweetmeats, betel nuts, spices, sago, rattan, and preserved fruits, the last including a species of plum, which, as is claimed, is the most luscious of all the fruits. There are also shown the various tools by which the pith is extracted from the palm, grated into powder, and kneaded with water, in the preparation of sago flour, several jars being filled with sago cakes. Ranged along one of the outer walls are groups of agricultural implements, and strung beneath the cornice is the dried skin of a huge boa constrictor.

The forest wealth of Johore is illustrated in another portion of the hall by polished sections of native woods, and by a large and beautifully carved model of the royal residence, with the dining room and kitchen which connect with it. Here also are sheets of the reddish substance stripped from the inner bark of a native tree, and largely used for clothing.

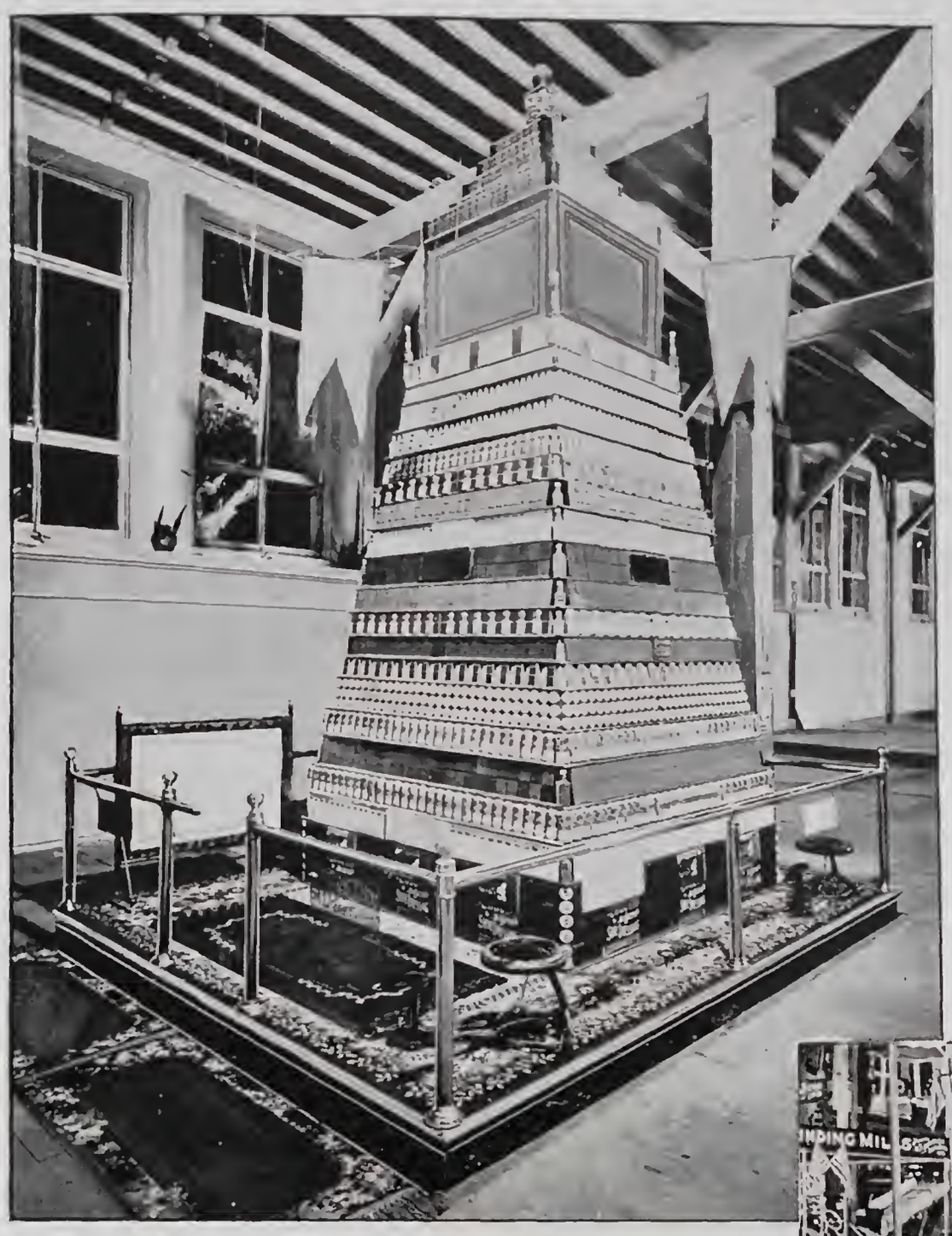
In the centre of the United States pavilions is a Persian exhibit of rugs, tapestries, ceramics, brass-ware, and wood-carvings. The fabrics come from all the industrial centres of the empire, some fashioned almost entirely of silk, and others of the wool of the Angora goat. Brilliant colors seem to be in disfavor, deep blues and yellows being mostly used, except for the silken rugs of Shiraz with their changing hues, and those of Khorassan dyed in brilliant carmine. Gold and silver embroideries



ORANGE FREE STATE



ADMINISTRATION PLAZA CHICAGO DAY



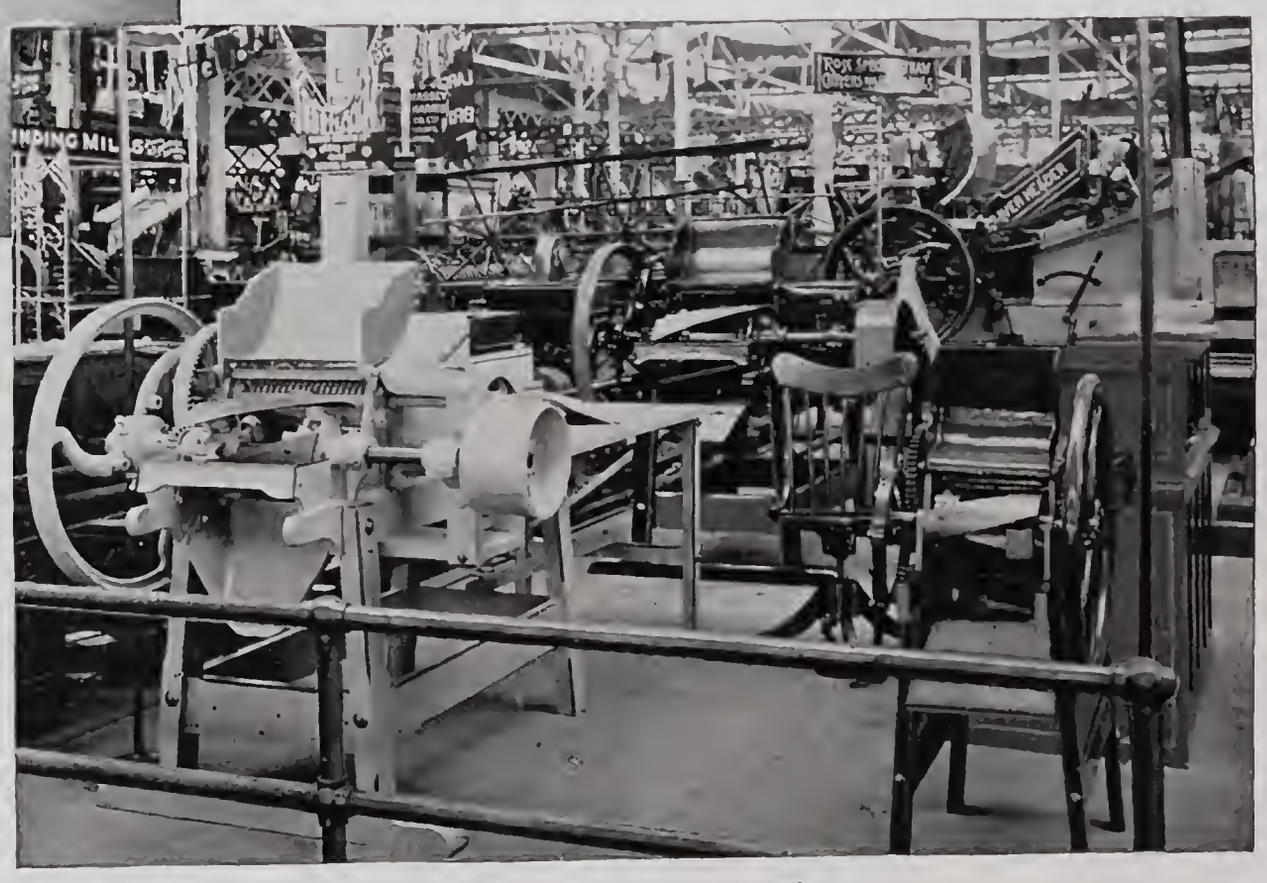
OIL PYRAMID

ing, and curios illustrative of life in Liberia, there are bracelets of iron, brass, and copper, leather bags and water bottles, blue and white cloths, warriors' caps, and women's skirts and head-dresses of grass, with leather charms, hideous wooden idols, spears, swords, daggers, and dirks, looms, inkstands, pens, bars of iron, wooden sandals, embroidered gowns, hammocks of cloth, yarn, and grass, powder horns, photographs, postage stamps, postal cards, metal and paper money, newspapers and books, strainers for palm butter, palm oil gourds, blacksmiths' tools, and bellows, chairs, stools, and trunks of bamboo, fishing nets and baskets, and fine needlework. Among the last is an embroidered satin quilt, upon which is represented in raised work a coffee tree in full bloom.

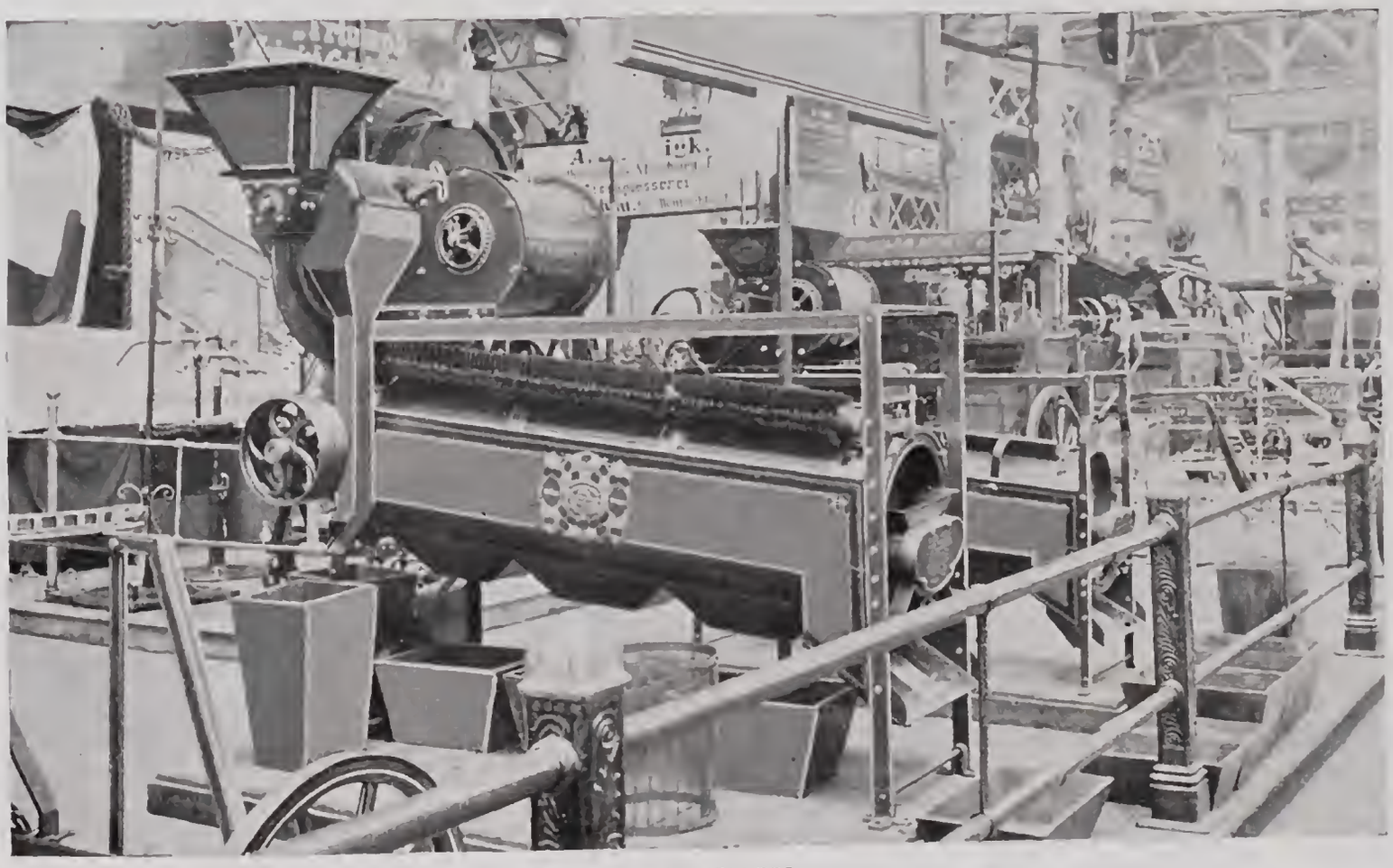
From an enumeration of the articles displayed, it would be inferred that Liberia is still a country of tribal distinctions, as well as a community of civilized and intelligent people. The contrast in the social conditions of the republic is illustrated in a reproduction of the bamboo hut, thatched with

and several specimens of rich jewelry work are also on exposition; but more precious than these is a translation of the entire Koran written on tiny parchment leaves, and enclosed in a small box which could be easily carried in the pocket.

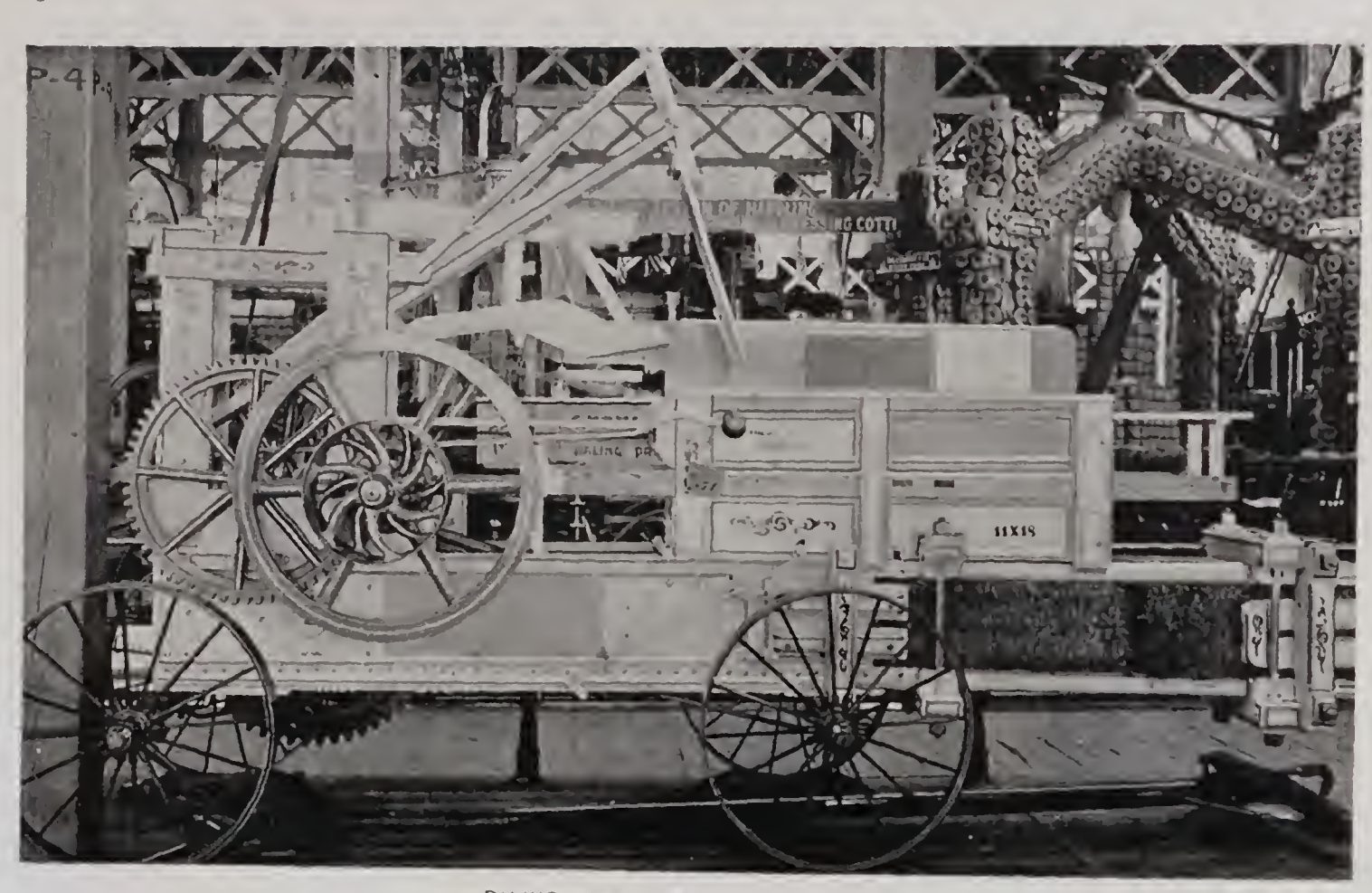
In the extreme northwest corner of the main building is the Liberian exhibit, which, though small in size, displays to excellent advantage the resources of the West African republic. Two immense horns form an arch to the chief entrance of the pavilion. Animal life is here in many forms. There are horns of cows, of antelope, elk, and deer, tusks of elephant and hippopotamus, and in the background is grouped a large collection of the skins of deer, monkeys, squirrels, tiger-cats, leopards, otters, coons, and snakes. Heads of different animals protrude from the walls, and more strange than all else is the miniature hippopotamus mounted upon a table. Until its capture in Liberia, a few years ago, this was believed to be an extinct species, and to-day there are only two other mounted specimens in existence, one in Paris, and the other in London. As to implements, weapons, cloth-



FODDER CUTTING MACHINE



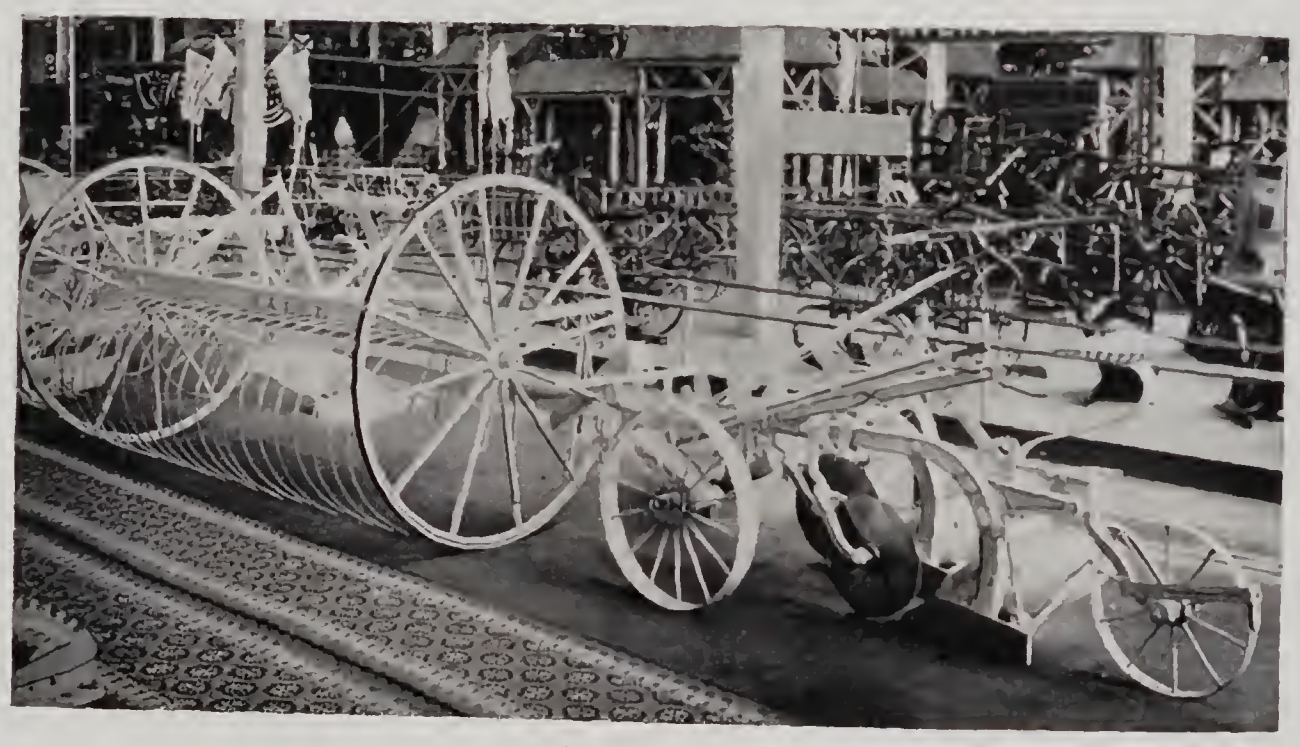
CORN SHELLERS



BALING PRESS FOR HAY AND STRAW

palm leaves, and the modern Liberian house, with its two stories and attic, surrounded by wide verandahs, and containing spacious halls, and airy cheerful rooms. Among the exhibits which show the products of the country and its growing commerce, may be mentioned coffee in bags and jars, sacks of cocoa, and of red, blue, and yellow dyes, bundles of fibres of the bamboo and plantain, boxes of iron ore and ivory, barrels of palm and nut oils, bunches of rice, and cases of crude rubber.

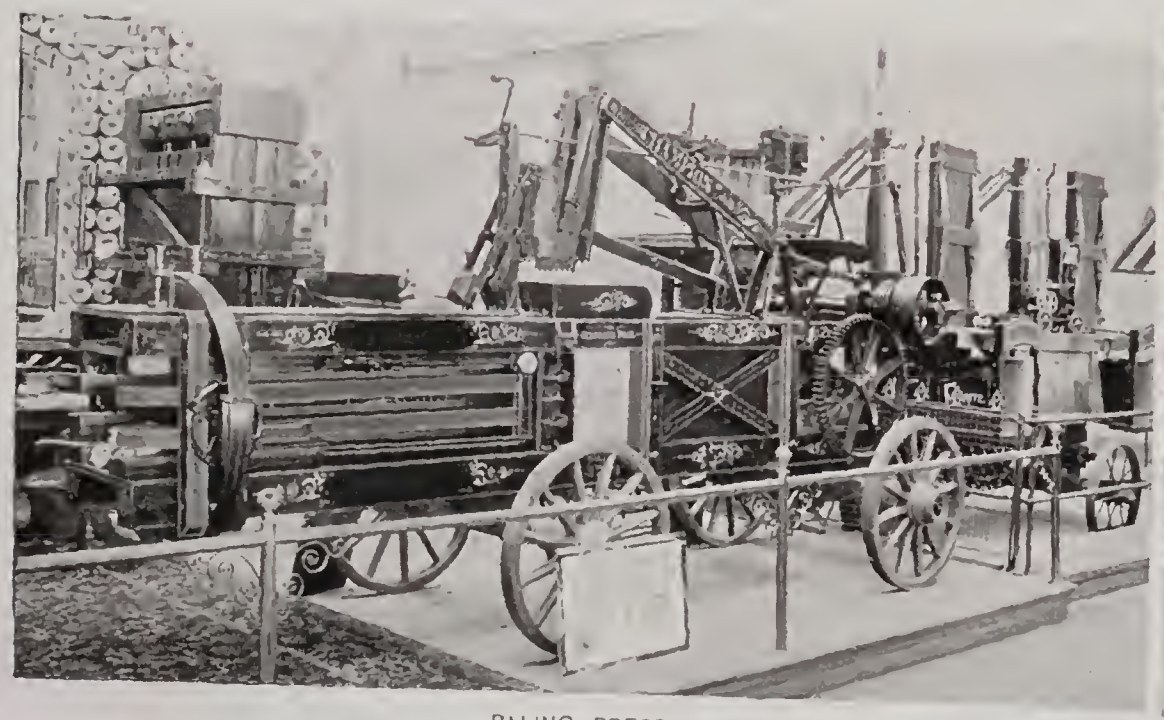
The Orange Free State has an attractive home in the south-western portion of the hall, decorated with skins, pelts, and ostrich plumes. A case of rough diamonds glistens near the entrance, and in the interior is a structure composed of jars of grain surmounted by a native deer. Near the Mexican section Siam has a booth containing grains, tobacco, edible birds-nests, and models of primitive vehicles and agricultural implements.



HAY RAKE

Along the aisle which separates Agricultural hall from its annex, are the collective exhibits of seeds, oils, and packing industries. Several of the first are housed in attractive pavilions; but as the main collection of their exhibitors is in the Horticultural building, this is by comparison a minor display. Among packing houses, however, such firms as Armour and company, Swift and company, and others of world-wide repute, not only show manufactured products, as butterine, stearine, lards, and oils, but also their methods of packing, preserving, and transporting meats. One firm exhibits a model refrigerator car, with glass sides, its contents neatly arranged for shipment. The hog is seen in all postures, and fashioned of many materials. One group contains a stuffed animal in a gilded chariot, with shoats in place of steeds; in another is a huge hog made of lard, with spectacles on snout, and pen and inkstand beside him, while a third exhibitor symbolizes perhaps the prosperity which pork has brought him in the form of a group of golden pigs around one of the pillars of his pavilion.

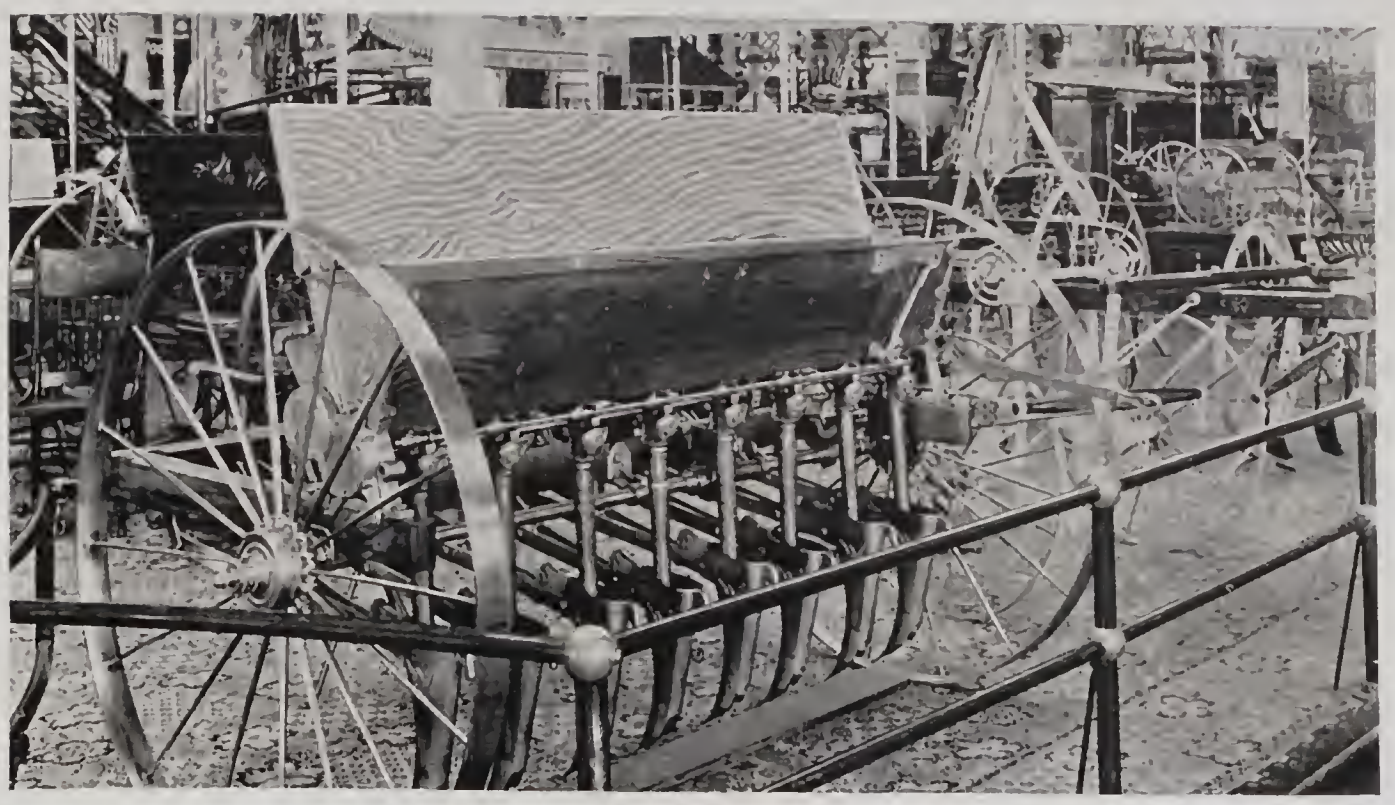
The American Cotton Oil company, of New York, has a structure in this vicinity, in the shape of a circular colonnade of Corinthian pillars, joined by metallic garlands which meet in the centre, and support an American eagle perched on a globe, the entire composition resembling frosted silver. Opposite is one of somewhat similar



BALING PRESS



FODDER CUTTER



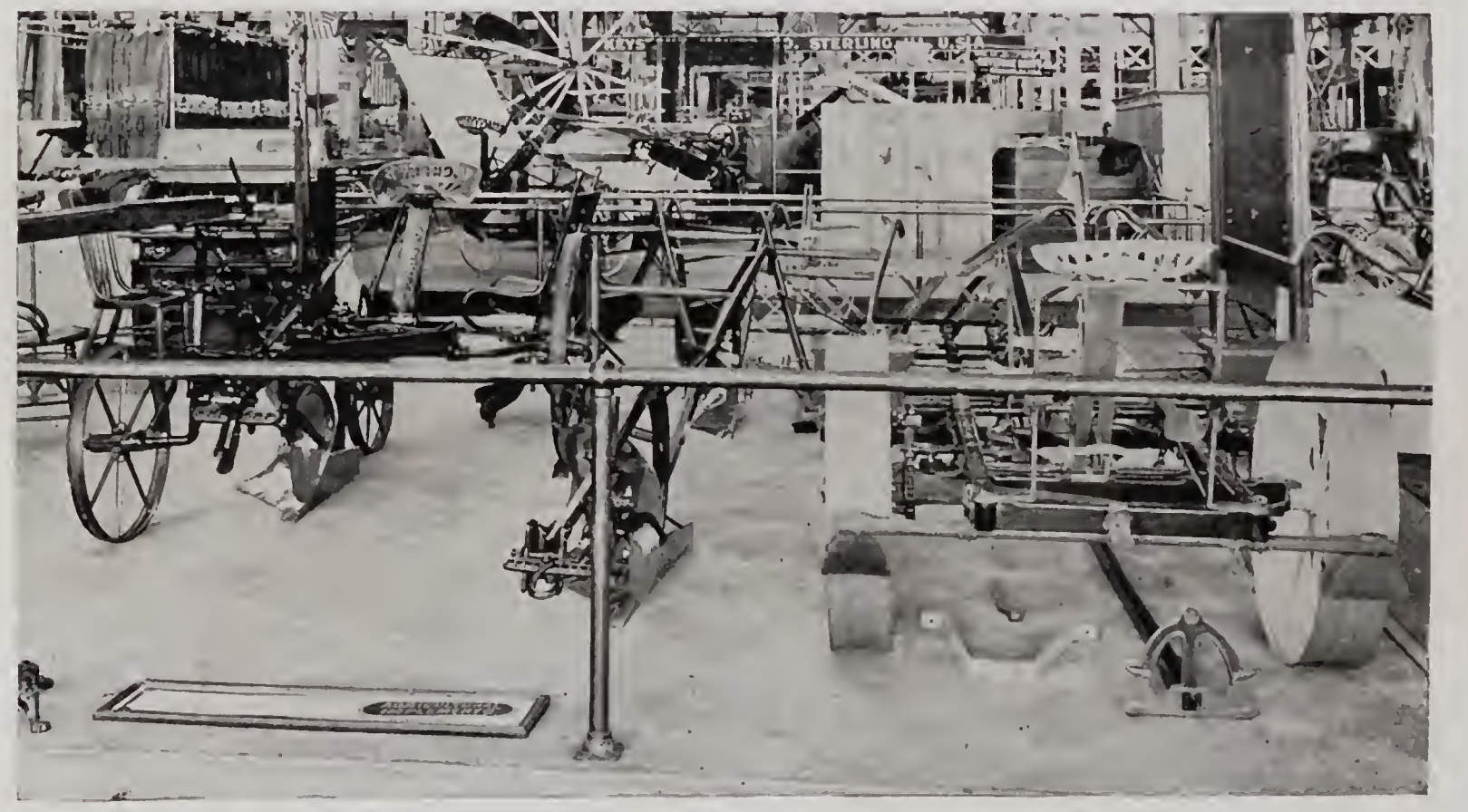
A MODERN DRILL



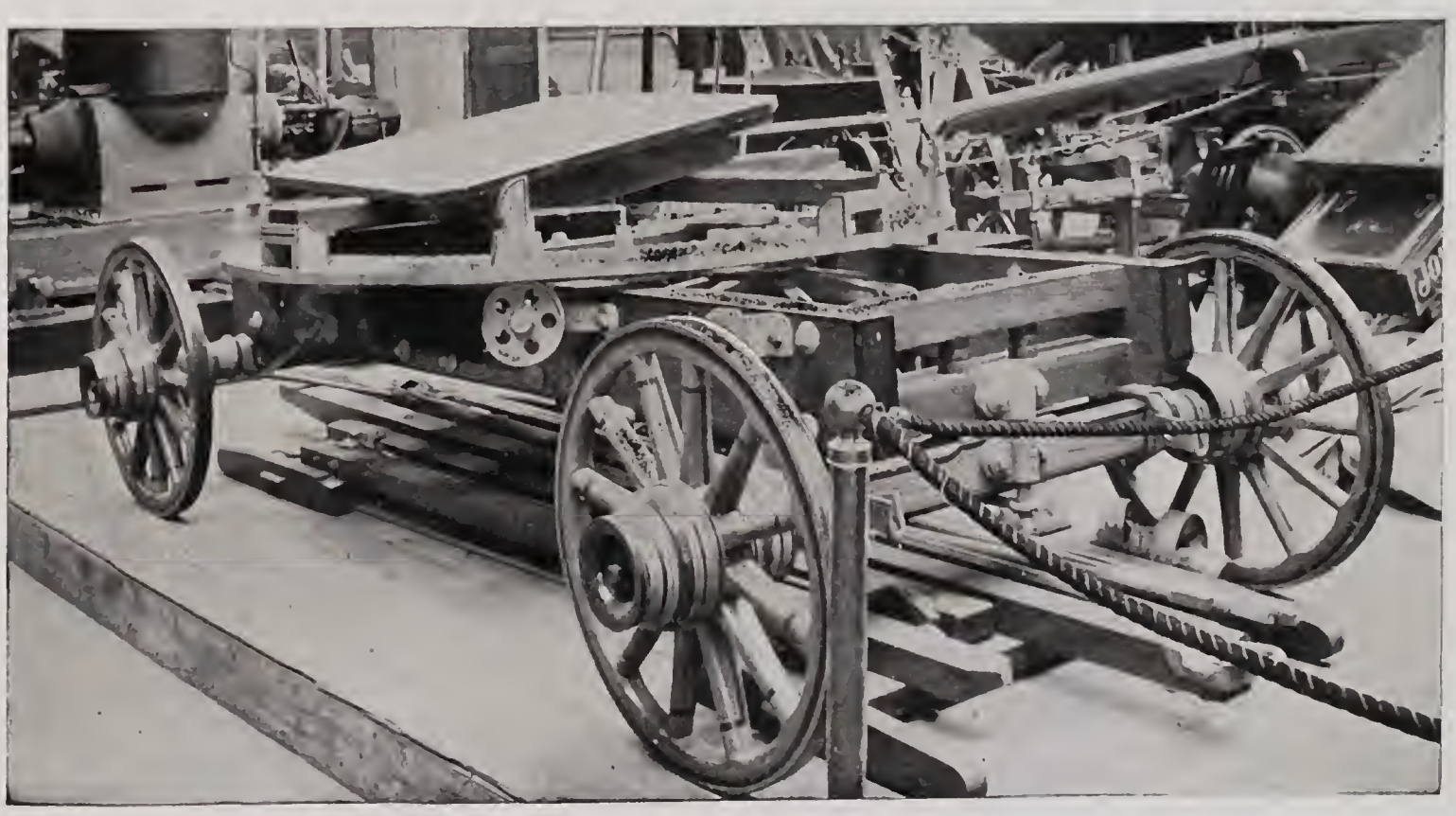
CULTIVATOR

design, representing one of the company's departments transacting business under another name, and manufacturing a preparation of cotton-seed oil and beef fat known as cottolene.

In the northern portion of the annex, Canada, France, Germany, and Russia have a collection of agricultural machinery, together with such as is used for manufacturing farm products into food and other preparations. Apart from these, the annex is mainly occupied by the collective exhibit of the United States, Illinois, New York, Ohio, Iowa, Minnesota, Wisconsin, and Michigan, combining to present a forcible illustration of American ingenuity and industry. From the special forms of agriculture developed in various sections of the country have been evolved the hundreds of machines here placed on exhibition. Among them are the plows used on prairie lands, and such as are specially constructed for the cultivation of hill-sides. There are harrows and pulverizers, threshing machines and separators, reapers and binders, fanning mills and feed cutters, mowers and drills, grain measures and baggers, straw stackers, stump extractors, hay cutters and rakes, manure spreaders, and presses for hay, straw, cotton, and fibre. There are also such special appliances as the potato planter, digger, picker, and loader, the corn and pea sheller, the rice and coffee huller, the tobacco hiller, the oat clipper, the grape and berry hoe, the horse clipper, and sheep shearer.

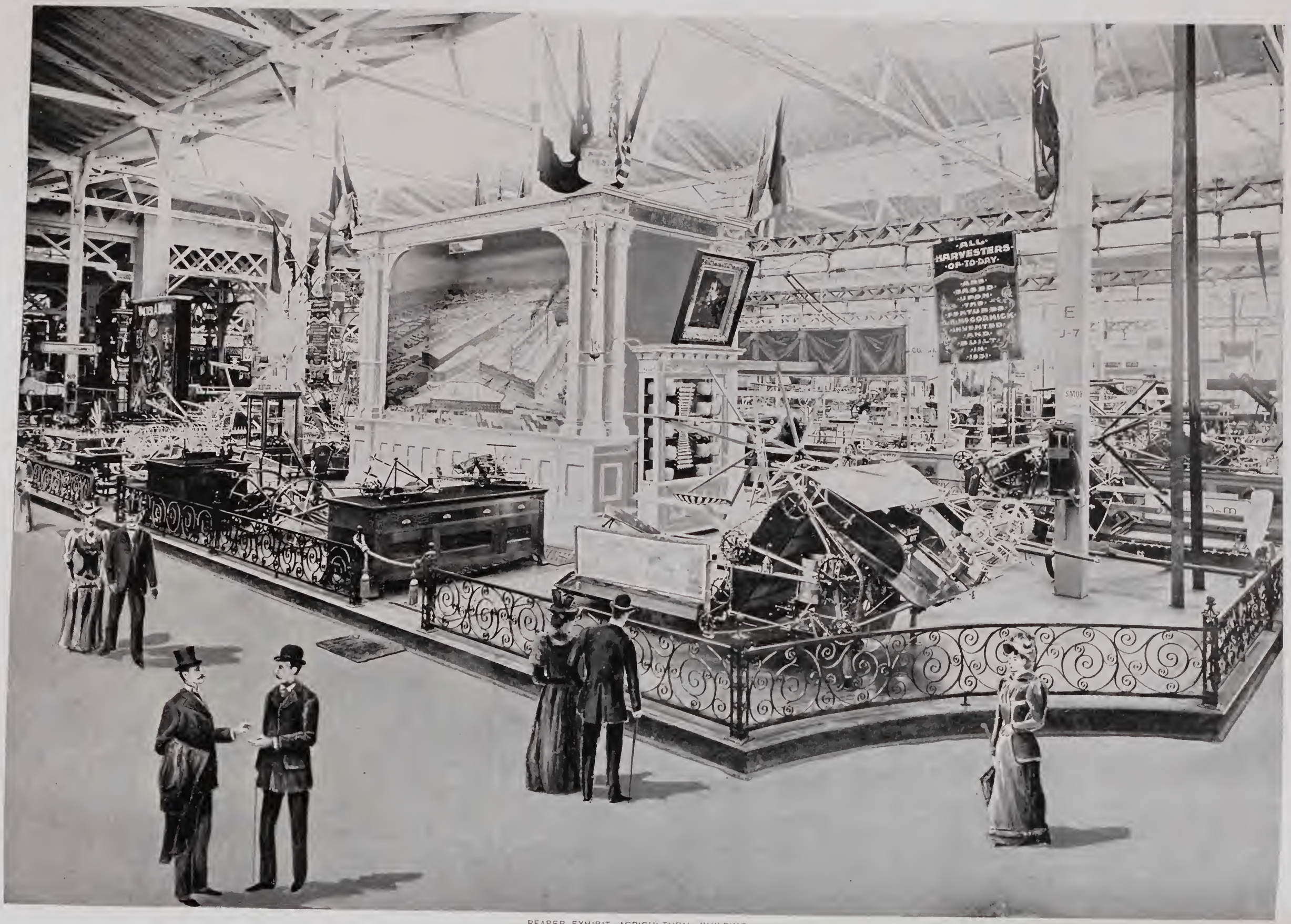


AGRICULTURAL IMPLEMENTS

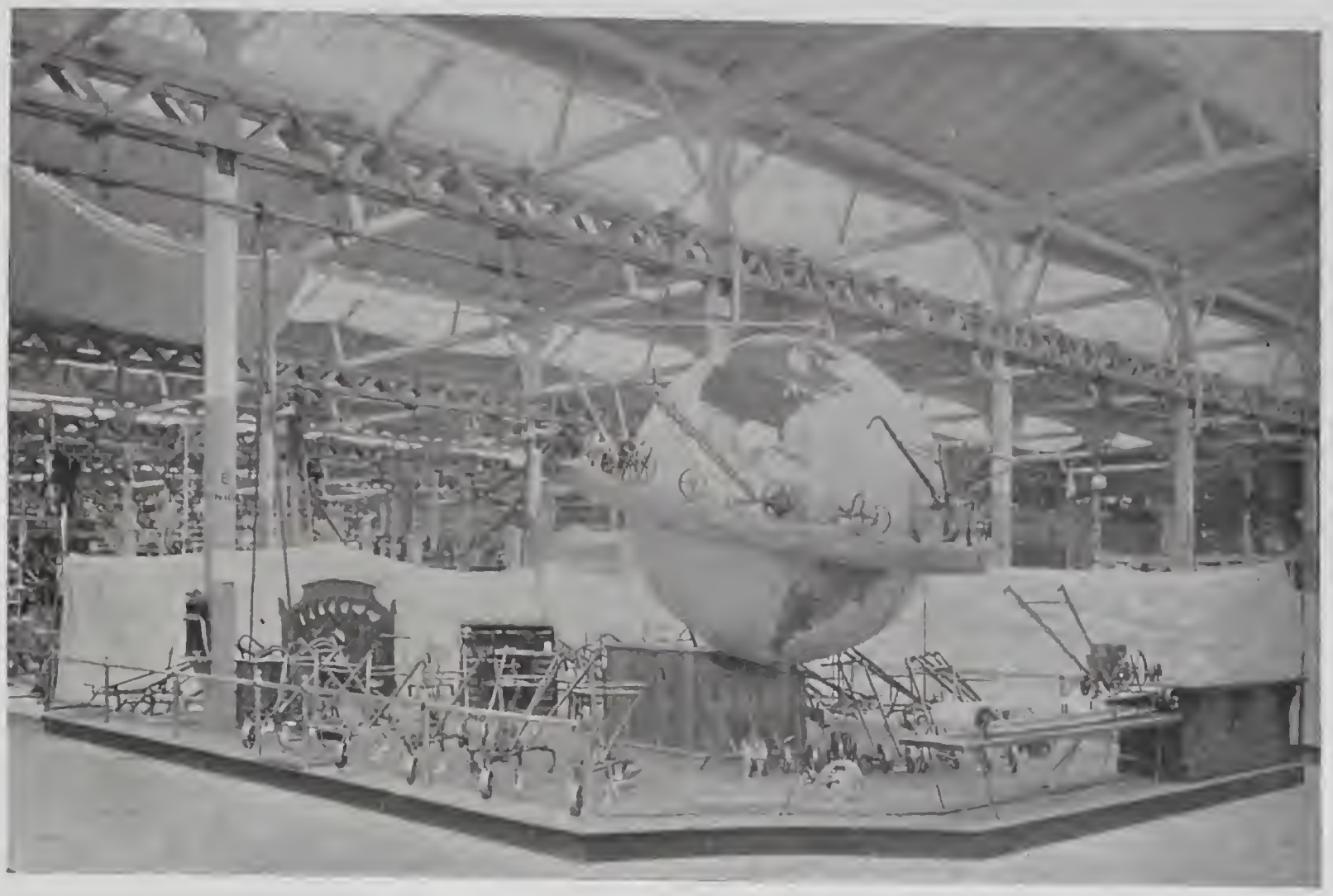


HORSE-POWER CORN SHELLER

A mere enumeration of the more prominent groups and special apparatus contained in the annex is a sufficient excuse for omitting descriptive detail,

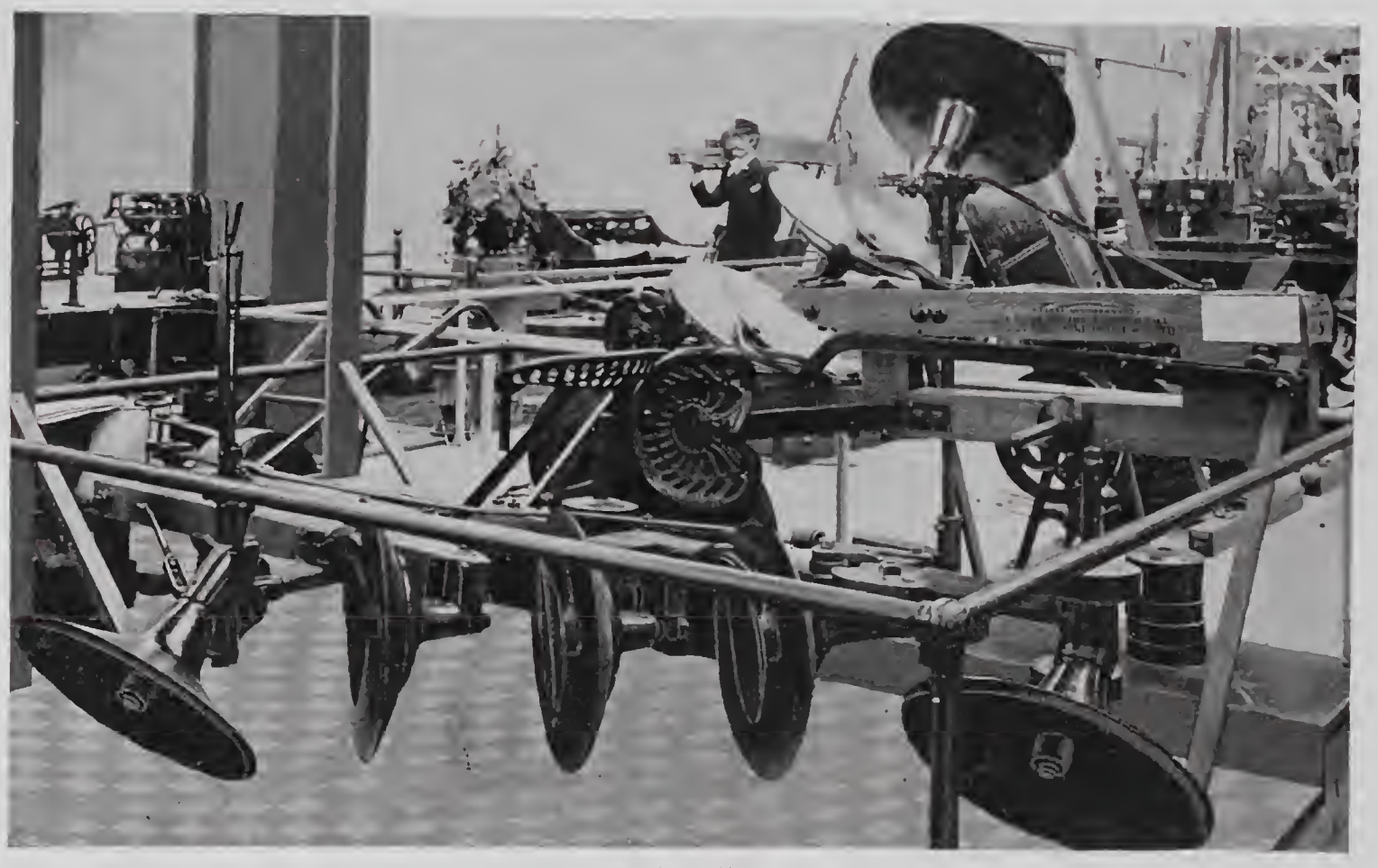


REAPER EXHIBIT, AGRICULTURAL BUILDING

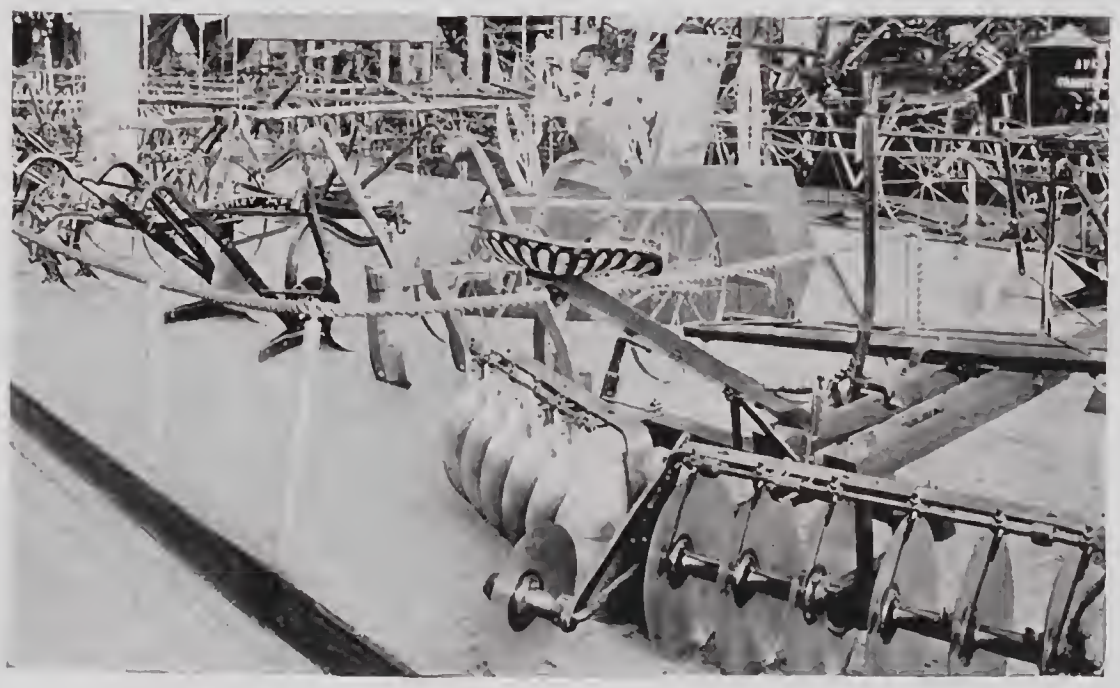


DISPLAY OF GARDEN TOOLS

and it is almost unnecessary to say more than that the foremost of American manufacturers have placed their choicest specimens on exposition. Among the more noticeable exhibits is that of the McCormick Harvesting Machine company of Chicago, who are the largest manufacturers of their kind in the world. Their exhibits consist of harvesters, binders, mowers, and reapers, the first including rice and corn harvesters, and all of them extensively used, not only in the United States, but in foreign lands, wherever grains and grasses will grow. In the patent office exhibit of the Government department, there is a series of models, showing the processes of development in the McCormick machine, and forming with others, a complete illustration of the progress and preëminence of the United States in the manufacture of agricultural machinery. Side by side with the perfected mechanisms of the present day is the model of the first practical reaper invented by Cyrus H. McCormick in 1831, and in the summer of that year, worked with excellent results in a field of oats at Walnut Grove, Virginia. He was then only twenty-one years of age, but inheriting from his father, Robert McCormick, a taste and gift for invention, took up his work on the reaper after observing the failure of previous attempts made by the latter. Hence his name was deemed worthy of a place among those of the great inventors and discoverers inscribed on the frieze of Machinery hall, for in his original reaper were embodied the fundamental principles on which all reapers and harvesters have since been made.



ROTARY PLOUGHS



HARROWS AND PLOUGHS

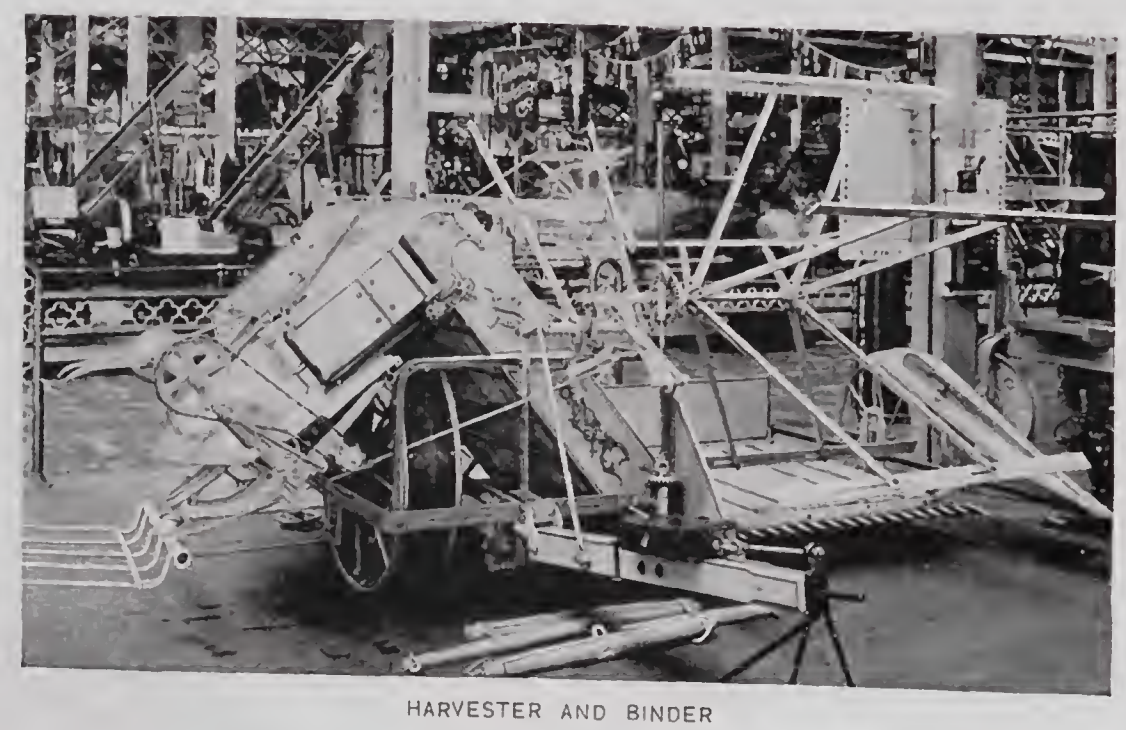


CYRUS H McCORMICK

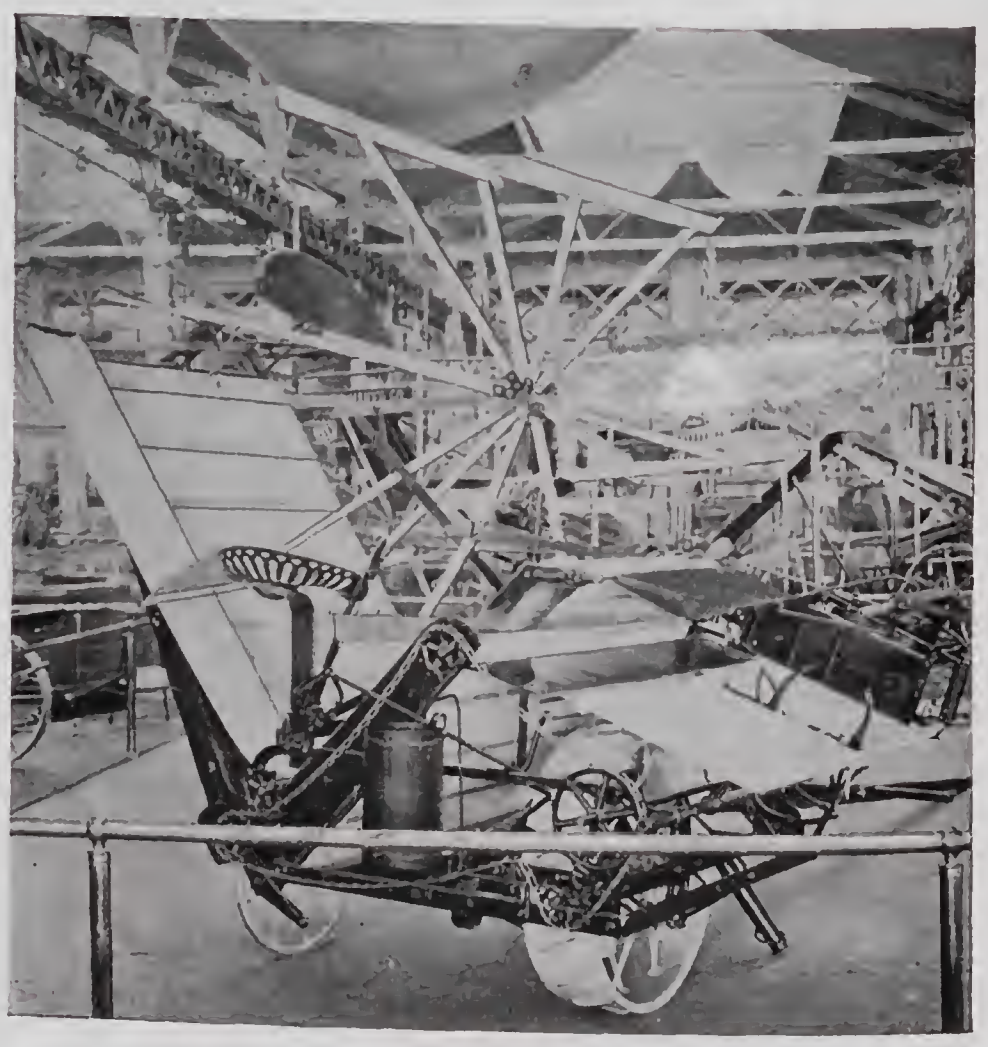
An interesting feature is the panoramic illustration of the growth of the company's business. The story is depicted upon opposite sides of a screen, one showing the old fashioned blacksmith shop in Virginia, where Cyrus H. McCormick forged the iron work for his first reaping machine, and the other the Chicago works as they appeared in 1893, with their forty acres of factories, warehouses, and yards, with trains running to and fro, and vessels

PLOUGH EXHIBIT

loading and unloading at the docks. Here also are the medals and other recognitions, awarded at former international expositions, beginning with the gold medal of the American institute, bestowed in 1845, and including those which were granted at the London Expositions of 1851 and 1862, the Paris Fairs of 1855, 1867, 1878, and 1889, and the Philadelphia Exposition of 1876. Especially were the merits of the McCormick reaper recognized at the London Exhibition of 1851, though still a novelty to British manufacturers and agriculturists. Even the London *Times*, which had before described it as "a cross between an Astley chariot, a wheel-barrow, and a flying machine," made amends by pronouncing it to be the most valuable article in the Exhibition, and one that of itself would almost repay its entire cost. Said the commissioner of patents in his report for 1849: "In agriculture it is, in my view, as important a labor saving device as the spinning-jenny and power loom in manufactures. It is one of those great and valuable inventions which commence a new era in the progress of improvement, and whose beneficial influence is felt in all coming time."

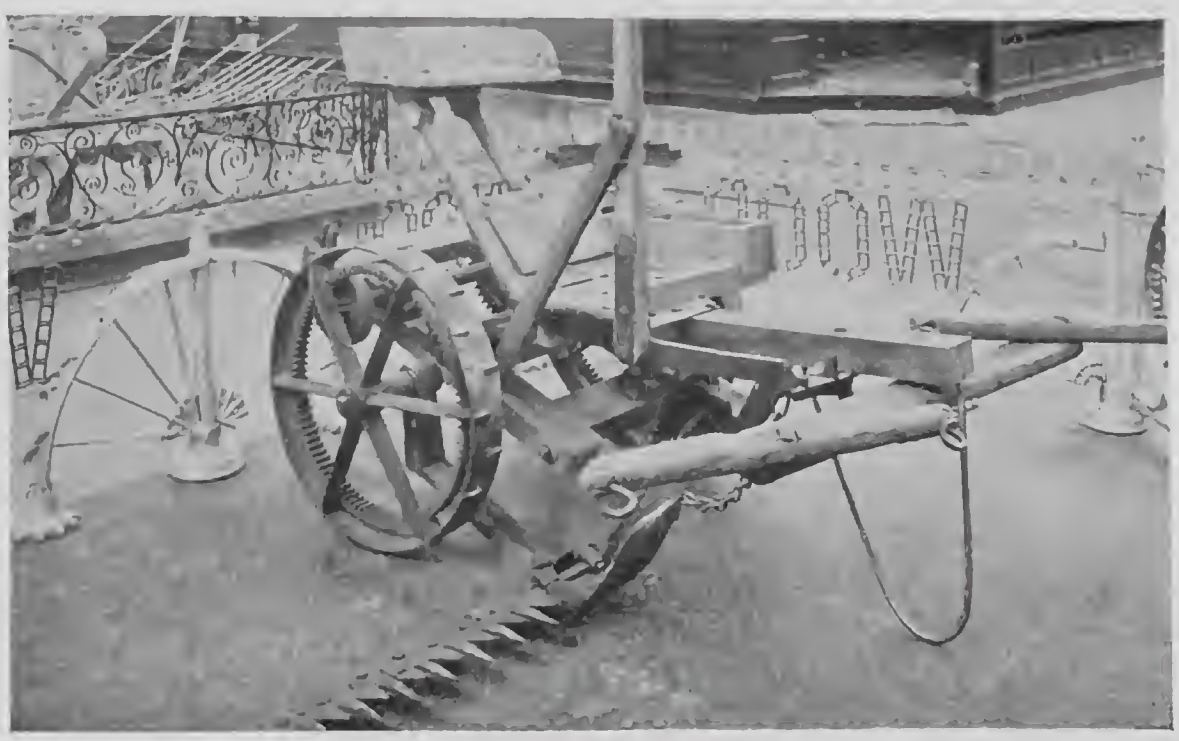


HARVESTER AND BINDER

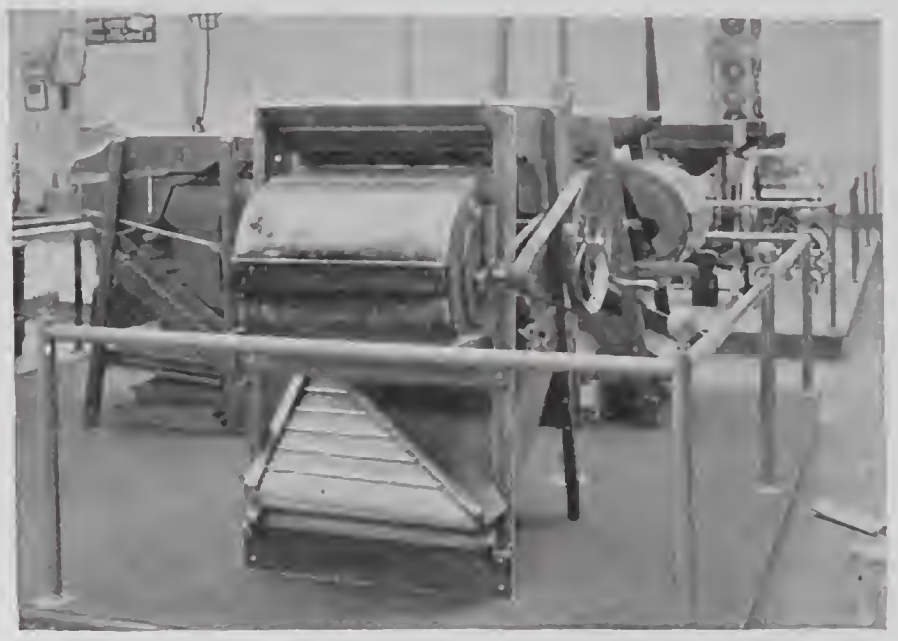


HARVESTER

The Chicago firm of William Deering and company has a creditable display of harvesting machinery, this firm claiming to be the original makers of what are termed elevator harvesters and automatic twine binders. The Oliver Chilled Plow works of South Bend, and the Moline Plow company of Illinois have each a spacious pavilion, the central figure of the latter being a mammoth bronze statue of a Dutchman, with outspread wings, typical of its Flying Dutchman sulky plough. Other establishments have also attractive headquarters, especially those which occupy a large group of pavilions of tasteful rustic design. A Philadelphia house which manufactures garden implements, groups its specialties on a platform surrounding the equatorial line of a huge revolving globe. Here are machines for sowing the seed and fertilizing



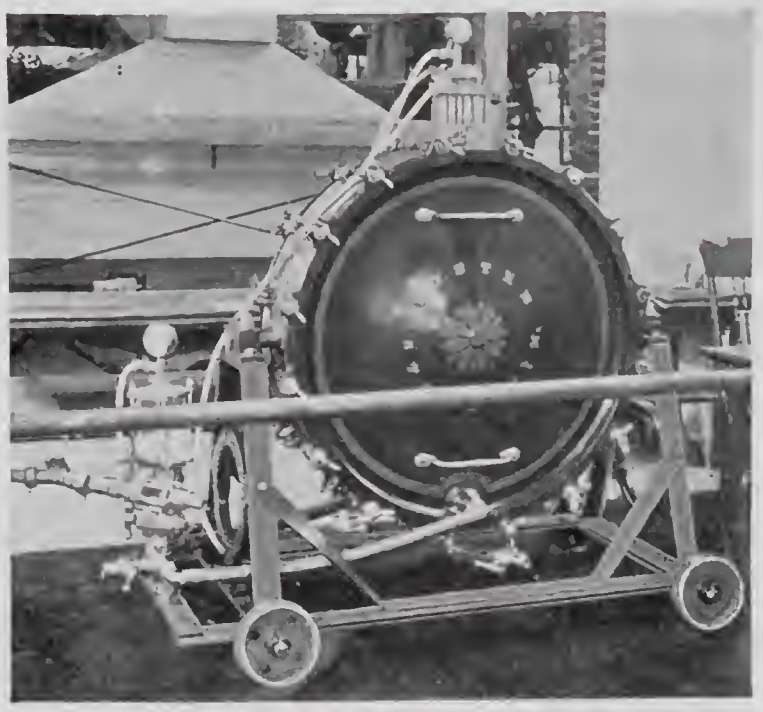
OLD FASHIONED MOWER



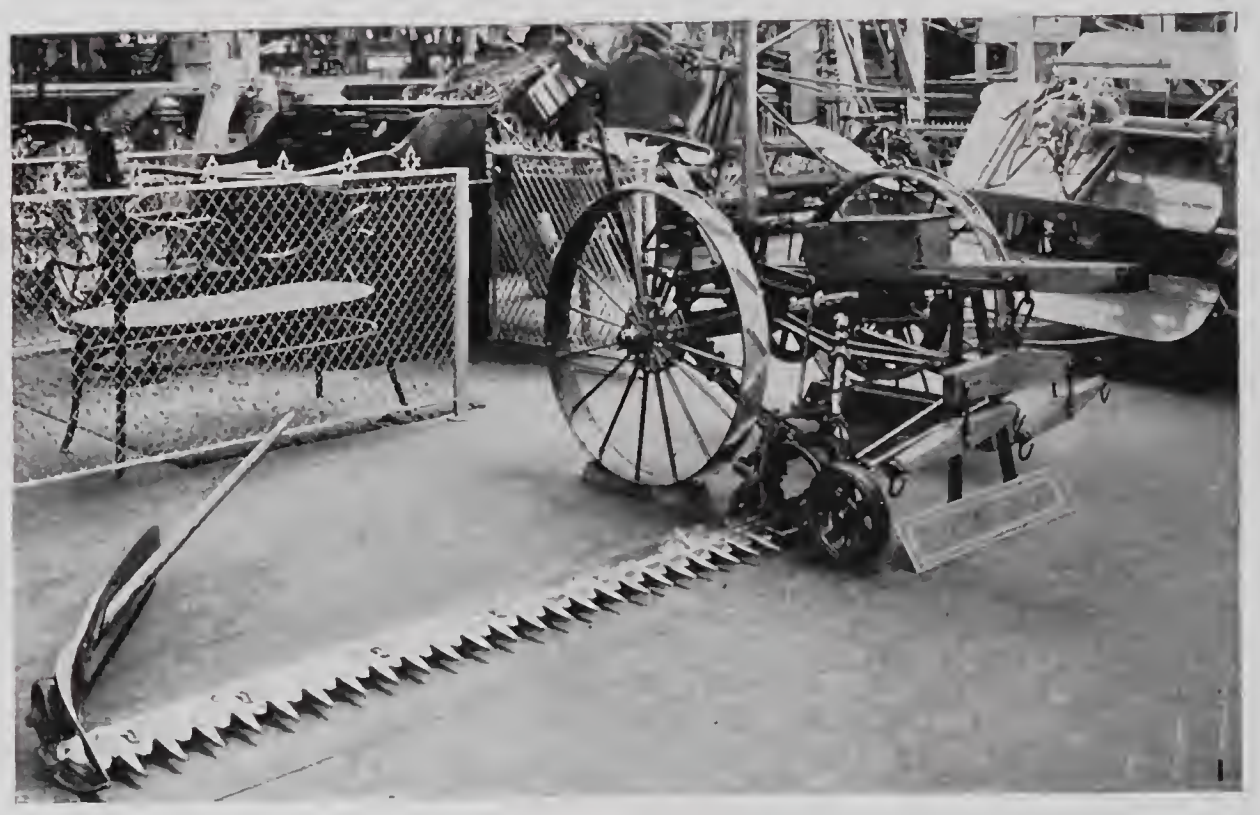
FANNING MILL

the soil simultaneously, and those which plough, hoe, cultivate, and rake at a single process. Other specialists are those which manufacture binder twine, an Auburn, New York, establishment constructing its entire pavilion of balls of this material. One of the most unique exhibits is that of the Eagle Cotton Gin company, of Bridgewater, Massachusetts, which has machinery in operation for illustrating the most improved system of freeing cotton from the seed, and preparing it for the factory. In a model of an oil mill are displayed all the processes for extracting oil from this seed, formerly thrown away as worthless, and for grinding that which remains into fertilizing materials.

The second floor of the Agricultural building is divided transversely by two broad apertures, or light wells as they are often called, eight minor shafts running east and west between the several galleries. Collective American exhibits largely occupy this story, and first may be mentioned those of the brewers of the United States, installed in the broad aisle which skirts the western wall. There are about thirty participants, many of them with ornate and handsomely equipped pavilions, conspicuous among which are those of the Pabst Brewing company, of Milwaukee, and the Christian Moerlein brewery, of Cincinnati. The latter, neatly decorated in cream and gold, contains an array of richly costumed figures representing historic characters of many nations, with others symbolic of the four



WATER FILTER



MODERN MOWER

seasons, thus advertising the general consumption of Cincinnati beer. The Milwaukee establishment has a gilded model of its plant, on a scale of one inch to the foot, enclosed in a pavilion of terra cotta, crowned with a dome in mosaic work of stained glass. The headquarters of a Detroit company are fashioned entirely of bottles, and a Rochester brewer displays in motion a model of the machinery that makes his beer.

Occupying the entire southern gallery is the display of dairy implements and appliances, ranging from the common milk-jar and butter mould to machinery worked by steam, for the making of butter and cheese.



WINDMILL OF SALT

There are also many varieties of salt, the pavilion of a Genesee company showing in three large cases the grades best adapted to the manufacture of butter and cheese, with such as serve for table use. It is no secret that dairies use various preparations for hastening the curdling of cream, and giving color to cheese and butter. By a Copenhagen factory, with a branch at Little Falls, New York, are exhibited extracts and ferments for ripening cream, chemical coloring matters, and a collection of similar articles. In the centre of its pavilion is a large glass frame, containing the medals and prizes awarded at former expositions.



FERTILIZERS

In the eastern gallery the state commissions and bee-keepers' associations have arranged an exhibit of honey and honey-comb in many forms, together with the most improved and recent apparatus used by apiarists. The exhibits of honey, whether in the comb or otherwise, are classified according to the food of the bees, including clover and basswood, white sage, buckwheat, and other varieties. Ten of the mid-continental and Pacific states, together with the province of Ontario, occupy sections in this group. New York has a collection of comb-honey weighing nearly 100 pounds, the product of a single colony at Attica. In the Nebraska case are specimens of finished workmanship in wax, in the form of cupids, angels, flowers, and fruits. Granulated honey and straw bee-hives are features in the Minnesota exhibit, and Illinois has a model of a house made entirely of wax.

Adjacent to this section, enclosed by a bamboo railing, are several Javanese huts, on the walls of which, or forming a part of them, are native musical instruments, fashioned, as are the former, of bamboo. Rice and other grains, with coffee and tea, are here displayed, the last varying in color from light green to black. There are also Batavian hats of all grades, with swords and daggers, violins, and models of a native bullock cart and of one of the suspension bridges, in the building of which across deep chasms the Javanese show remarkable ingenuity. At the back of the booth hangs a large painting representing a village such as is reproduced on the Plaisance, and with extensive rice fields stretching far away toward the horizon. It is a cheerful, sunny scene, painted by a Javanese chief, who, though he never received instruction in art, was rewarded with a place of honor in this locality.

In the north gallery, west of the dome, are cases filled with domestic wools from nearly a score of states. Ohio and Wisconsin occupy entire sections with their numerous grades, fine and coarse, long and short, combing and pulled, washed, scoured, and unwashed. A Philadelphia house has an extensive display of foreign varieties, and near by New Zealand exhibits her wealth of animal fibre.



EXHIBIT OF SOAP



CANE SUGAR IN GLASSES

Between the east gallery and the central court, are exhibits of flour, and such food products as canned vegetables and meats, coffee, olives, apple butter, plum puddings, soups, starch, baking powder, yeast cakes, and oats, corn-meal, and buckwheat, in the form of food preparations, together with soaps and fertilizers whose bases are potash and soda. The most extensive display in the line of cereals is by a New York factory, in whose pavilion comely damsels in Quaker costume serve cakes made of the company's preparations from Quaker oats. Another manufacturer advertises his business in the form of a rustic hut, constructed of gilded cocoa-nuts, while a soap maker erects a pyramid of his special products on a thirteen sided base, representing the original



CASTLE MADE OF TOBACCO

states, and above it a statue in soap of the woman who, as is said, was the first to fashion the stars and stripes in the form of the national emblem. Beyond is a section containing a series of photographs representing growing plants, with a row of vases containing vegetable life itself in all stages of growth, a case of crude nitrate of soda from Chile, and various fertilizers whose base consists of that compound.



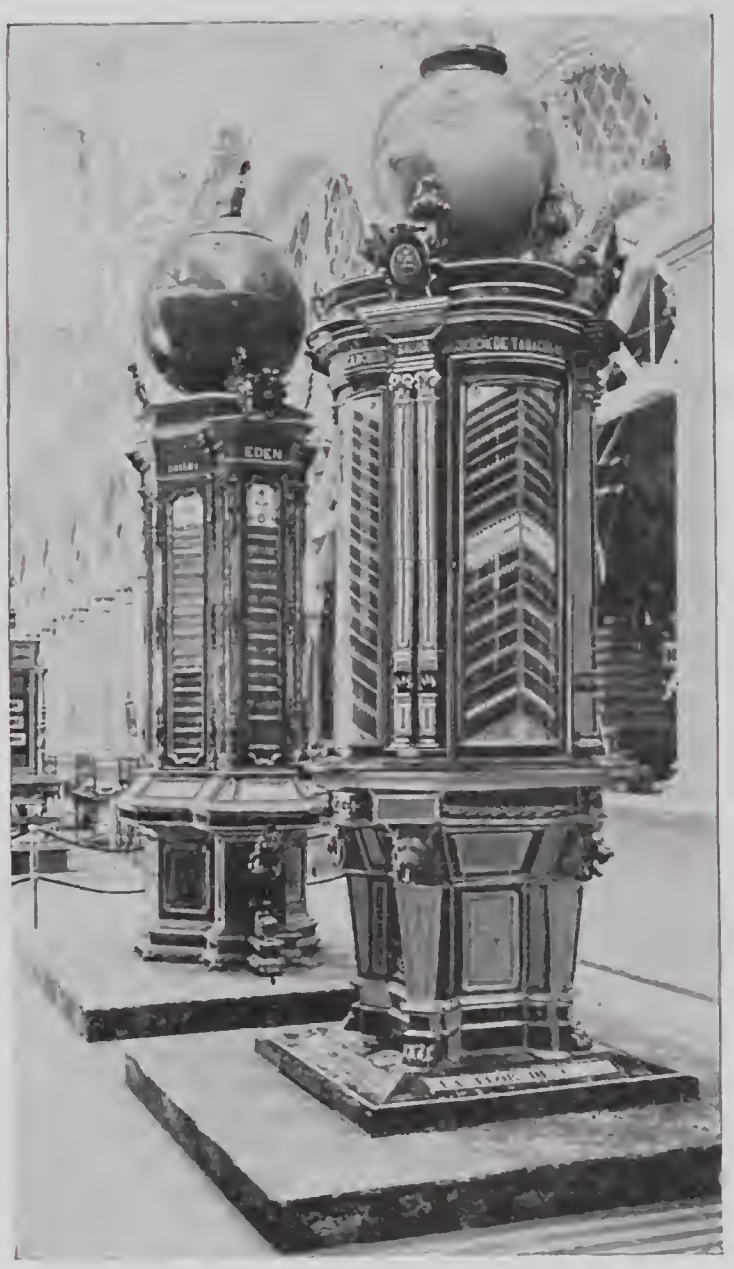
EGYPTIAN TOBACCO EXHIBIT

In the southeastern gallery is an exhibit of the milling industries of the west, a Minneapolis company showing models of its mills, and a Duluth firm housing its miniature machinery, illustrative of the modern roller process, in a tiny mill with an old creaking wooden water wheel, the latter an exact reproduction of a factory built near Reading, Pennsylvania, a century and a half ago, and still operated by a descendant of the original owners.

The western division of the gallery is largely occupied with preparations of food and drink, comprising such articles as condensed milk, evaporated cream, chocolate, cocoa, syrups, confections, macaroni, vermicelli, starch, mineral waters, cider, rum, brandy, liqueurs, and bitters, together with crackers and biscuits, cigars, leaf tobacco, and spices. Of the exhibits of condensed milk the most prominent is that of the New York Condensed Milk company, whose first works were established at Wolcottville, Connecticut, in 1856, by Gail Borden, president of the company until his death in 1874. For the products of this company, of which H. Lee Borden, the son of its founder, is now the president, it is claimed that they stand the test of all climates, and have been used in many lands for hundreds of thousands of children. The total quantity of milk thus treated in 1892 by various establishments in the United States was 400,000,000 gallons, and far the largest among them is the one referred to. The preserved milk, also prepared by this company, and largely supplied to the army during the civil war



TABLE CONDIMENTS



CUBAN CIGARS



CONDENSED MILK

mahogany and rosewood, filled with cigars, and surmounted by a globe, above which is the historic *Pinta*.

A New Jersey firm, which manufactures the Tiger brand of tobacco, has in the centre of its exhibit a fine mounted specimen of the man-eating species, bearing in his mouth a pail of the prepared weed. Wisconsin, Connecticut, and Massachusetts have collective specimens of leaf tobacco, Connecticut's display being confined to the variety produced from Havana seed. Adjoining the group of the New England Tobacco Growers' association is a small booth in which Honduras illustrates the variety and quality of her tobaccos, both in leaf, and in the form of cigars. Among the exhibits of spices may be mentioned that of a Chicago firm, whose dealings are largely with Penang, representing in gaudy colors an ancient Malayan temple, with sections of the allspice tree, twigs of cinnamon, and other crude forms of the products in which it deals, the raw material being scattered among a varied display of manufactured articles. Finally there is a collection of syrups, suggestive of the maple groves of Vermont and Ohio.



COCOA BOOTH

is condensed by a similar method, preserved with sugar, and hermetically sealed in cans.

In the collection of mineral waters nearly all the states are represented, showing how generally such beverages are coming into use. In a large and handsome booth a New York confectioner, whose specialty is the manufacture of chocolate bon-bons, has modelled from that material heroic statues of Columbus, Venus de Milo, and Minerva. A starch company of Oswego, New York, reproduces a Grecian temple in cream, gold, and light green, whose pillars and cornices are elaborately carved by hand from solid blocks of wood. Several eastern manufacturers of crackers and biscuit have neat and tasteful pavilions, while many of the cigars and tobacco booths are of unique design, an Egyptian exhibitor advertising his wares in a temple covered with hieroglyphics, and containing miniature monoliths, pyramids, and other familiar forms of ancient architecture. There is also a pavilion built in the Corinthian style, its pillars composed of glass panels, through which may be seen varieties of smoking tobacco, while elsewhere is a case of



BREWING EXHIBIT



DISPLAY OF DISTILLERY PROCESS

From agriculture in its proper sense let us turn to dairy-farming, a prominent industry in nearly all sections of the United States, where are more than 16,000,000 cows, or one to every four of her inhabitants, a larger number than is contained in Great Britain, France, and Germany combined. In 1892 the dairy products of the republic included some 35,000,000 pounds of butter, worth nearly $5,000,000, with more than 100,000,000 pounds of cheese, valued at $9,000,000, this apart from what is consumed by farmers, and their families and employés, which probably represents almost an equal amount.

In the Dairy building we have one of the smallest, and yet one of the most interesting departments of the Exposition, for here is contained not only a choice and complete display of dairy products, but what has been called a dairy school, where at intervals during the term of the Fair is held a series of tests for comparing the relative merits of various breeds of cattle. Here also are displayed in actual operation the best methods of handling milk and cream, and converting them into butter and cheese.

The structure is of simple design and neat exterior, covering somewhat less than half an acre in the southeastern portion of the grounds, near the Forestry building. Besides the offices of the department, the first floor contains the sections in which many of the states show their samples of butter and cheese, the latter also abundantly displayed in the galleries. The glass cases provided for the purpose are supplied with refrigerating apparatus, the cold air pipes banked under the floors, and against the walls. These sections occupy three sides of the hall in which machinery



LARGE BARREL MADE OF 10,500 SMALL ONES



ORNATE BREWING PAVILION

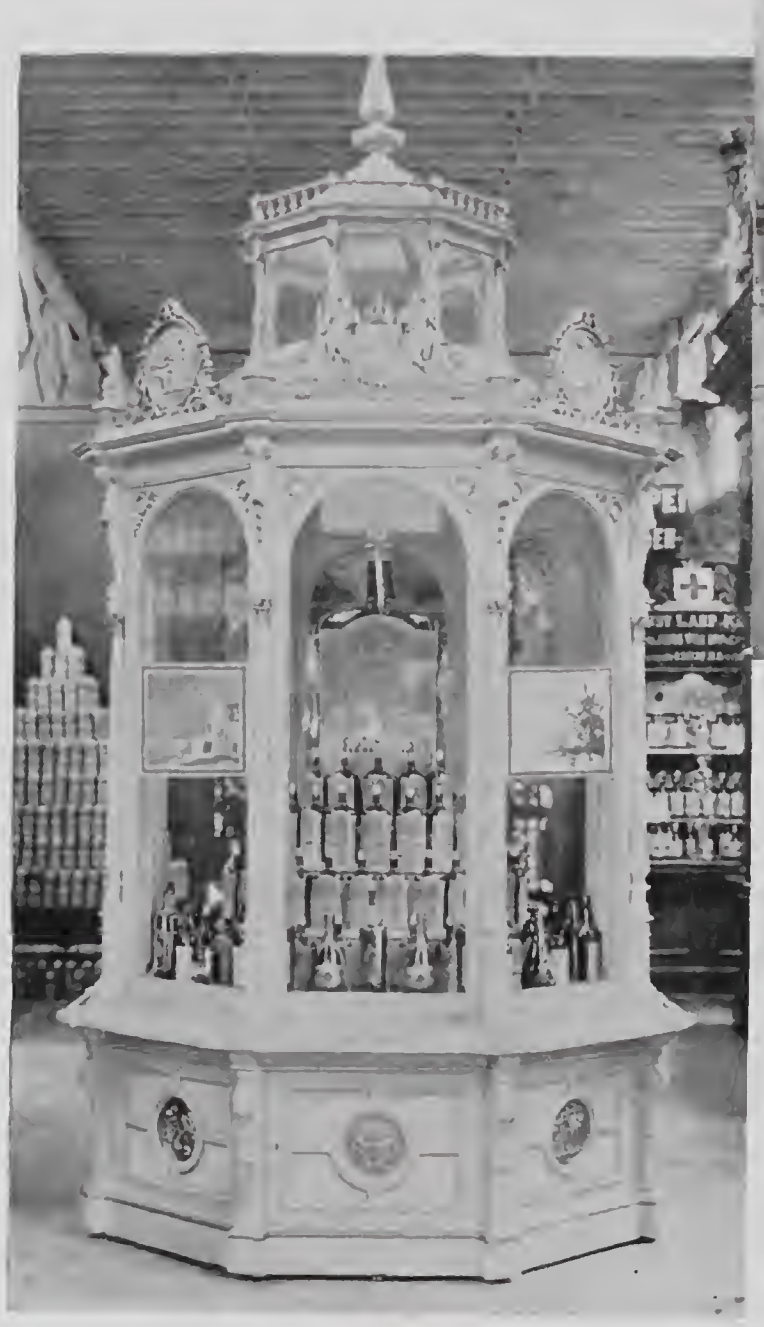


LOOKING UP THE EAST LAGOON

is in operation for the testing of milk and cream, and their manufacture into butter and cheese. This is known as the model dairy, and is well supplied with seats for the accommodation of spectators. Beneath are refrigerators and cold storage rooms for the preservation of dairy products. On the second floor is a café, which overlooks the lake, one of those secluded spots where the pilgrims of the Fair love to rest from their toil.



A STARCH EXHIBIT



IN THE GALLERY

At a suitable distance south of the Dairy building are sheds containing 200 cows, all of which are contesting for the honors of the dairy, together with a collection of blooded calves that form an amusing exhibit. Jerseys, Guernseys, and short-horns are the chief of the rival breeds. From the time the milk is drawn from the cow until it arrives at the model dairy it is under the watchful care of scientists connected with the test committee, and representing various agricultural colleges and experiment stations, the different herds being in charge of the breeding associations, by which they have been collected from all sections of the country.

Entering the building from the east, we find the collections of Indiana, Minnesota, and Nebraska ranged along the walls as specimens of yellow butter in plain and fancy shapes. The North Star state especially has an artistic display deftly molded in the form of flowers and fruits. Nebraska, one of the most prominent dairy states of the west, has an extensive assortment, an attractive feature being the heaps of butter globules, not yet fashioned, as elsewhere, into solid, grained masses.



PATENT FLOUR

New York, Iowa, Illinois, Ohio, Wisconsin, and Pennsylvania are also prominent in the Dairy building, though the exhibits of some of these states, with others of lesser note, were somewhat impaired by the partial failure of the refrigerating apparatus during the earlier days of the Exposition season. Moreover, on account of the contracted space available for the display of these products, the great dairy states were compelled to distribute their collections over the entire term of the Fair. Thus, as in the Live-stock and Horticultural departments, no description written in the present tense would properly represent the case. Iowa, for instance, which ranks next to New York in this industry, had little to show in the month of August, while in June, September, and October scores of her creameries sent the most fragrant of their products, filling several large sections. On the other hand,



SPECIMEN EXHIBIT



OLD COCOA MILL

bottles and in concentrated form, with the apparatus by which they exclude the air and expel gases, thus effectually destroying the germs of disease. Here for the first time this invention has been publicly exhibited in the United States, where, as is asserted, it would largely aid in the development of dairy industries, since by its use milk can be kept in good condition and in unlimited quantity, ready to be forwarded from remote regions to the great centres of consumption. Iowa, Michigan, New York, and Wisconsin have all a considerable

August showed New York and Illinois to excellent advantage, with rich saffron-yellow butter from the empire state, and cheddar and other choice brands of cheese. The Illinois exhibit was at once artistic, massive, and historic, for here were not only tubs and mounds of butter, and cheeses of generous proportions, but from Minneapolis came flowers, log huts, and mottoes of welcome, fashioned of the more plastic material, while an Elgin farmer sent the can used for the first shipment of milk to Chicago by rail in 1852. In August a strong feature of the exhibit was a select lot of Dutch cheeses from Rotterdam, and at that time Missouri and New Hampshire were well represented both in butter and cheese.

In opposite galleries of the Dairy building are small French and German exhibits, the former consisting mainly of a few cheeses, labelled genuine Roquefort, and samples of prepared milk for infants, almost identical, as is claimed, with that which nature produces, the preparation being contributed by a society which supplies the hospitals of Paris. A similar exhibit was made in the German section by a Mecklenburg company, where also Berlin inventors show milk in



CHOCOLATE PAVILION



A MOONSHINER S CABIN

space in the galleries, stocked with cheeses.

The series of experiments and tests conducted during the term of the Exposition were watched by dairymen from every part of the world. In the first ten days of May were illustrated the best methods of handling milk and cream, followed by tests of Jerseys, Guernseys, and short-horns as to the comparative value of breeds for the production of cheese, which is manufactured by machinery in the model dairy. In the closing days of May the apparatus for cheese making was replaced by such as is used for

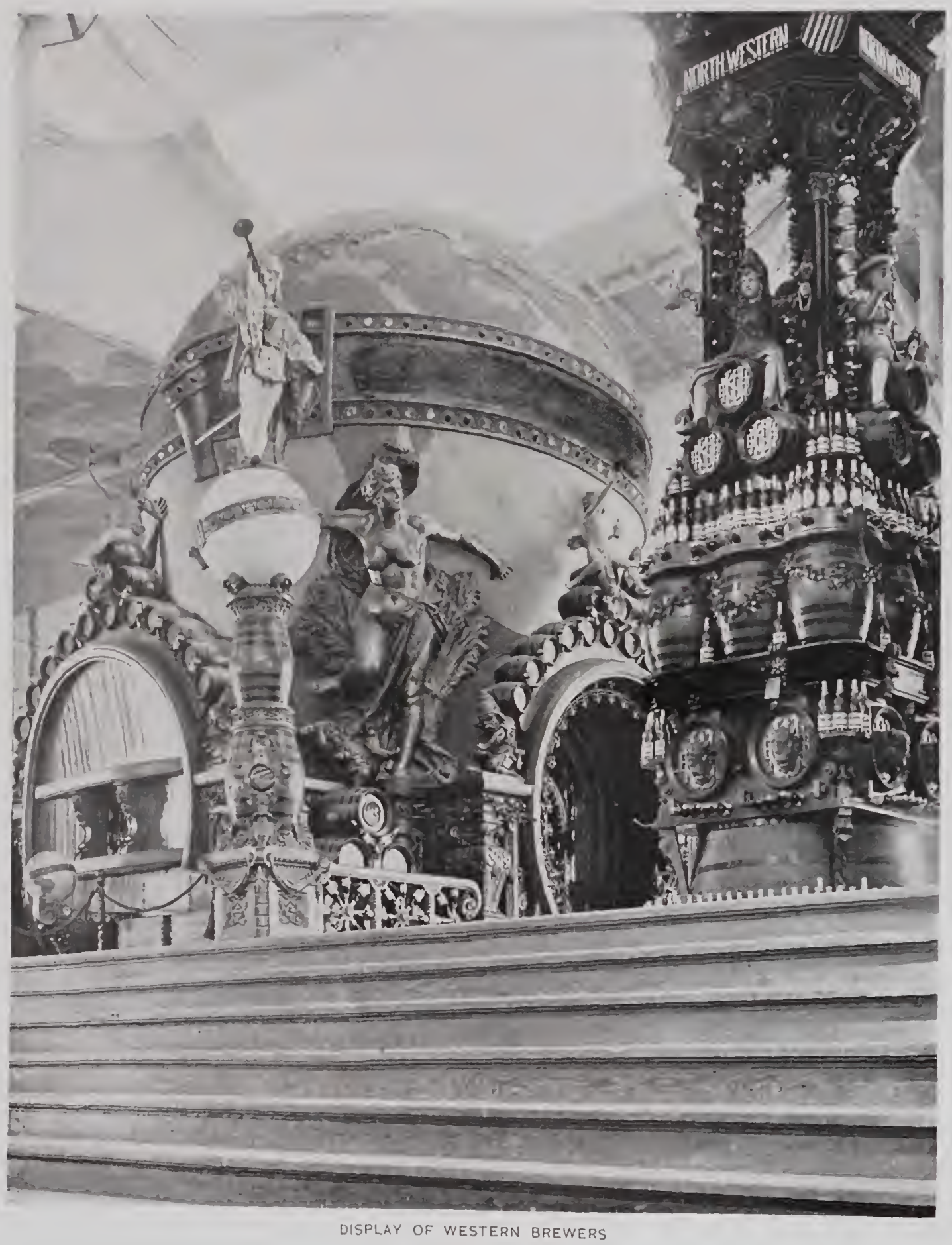
butter, with additional illustrations of modern processes for handling milk and cream. From the last of May to the close of August were compared the relative values of dairy breeds as producers of butter, with the nutritive qualities of skim milk and buttermilk, and the increase or decrease of live weight. In the following month the contest was as to butter alone, and in October there were still further illustrations of the various methods of



THE BREWERS' PAVILIONS

treating milk and cream, and of butter making, with examples of what could be done with young herds in this connection. In these experiments were represented several cattle clubs and associations which concern themselves mainly with blooded grades of stock, the Exposition management furnishing quarters and feed, and retaining the produce of the model dairy.

For the cheese test between Jerseys, Guernseys, and short-horns, twenty-five cows were selected to represent each of these breeds, the American Jersey cattle club of New York gathering its choicest specimens from no less than



DISPLAY OF WESTERN BREWERS

twenty states, and 30,000 thoroughbred animals. Among the exhibitors of Jerseys were Theodore A. Havemeyer, of New Jersey, and John Boyd, of Illinois, while Levi P. Morton sent some of his Guernseys, and in all the three breeds were many former prize winners. For several weeks before the cheese test in May, animals of each class were placed in the sheds south of the Dairy building, and from their milking records the contestants were selected. Thus it was that the Jersey milch cow, Signal's Lily Flag, valued at $15,000, and considered the queen of her race, was not permitted to enter the lists, for though with a record of more than 1,000 pounds of butter a year, at her preliminary trial she failed to meet the expectations of her admirers. Nevertheless the result was a decided victory for the Jerseys, the herd producing during the fortnight of the test more than 13,290 pounds of milk and 1,450 of cheese, against 10,900 and 1,130 pounds respectively for the Guernseys, and 12,180 and 1,070, for the shorthorns. The highest award for cheese-making was for a Jersey cow named Ida's Marigold, the property of a Buffalo bank president. As an outcome of the test, it was found that Guernseys produced cheese at smaller cost than the others.

Of the exhibits contained in the Forestry building, though officially classed with the department of Agriculture, mention will be made elsewhere in this work, in connection with the Horticultural display.

World's Fair Miscellany.—Exposition wits tell many amusing stories of the crowds which surge toward the galleries of Agricultural hall as the lunch hour approaches, as it is generally known that a number of exhibitors distribute their specialties in food and drink for advertising purposes. A cereal company, for instance, serves out biscuits; another, cakes; a third draws root beer for the thirsty; a fourth dispenses beef extract; a fifth, a dish of gelatine, thus permitting the needy to enjoy a gratuitous bill of fare. Among the jokes that passed current as to distinguished visitors was one concerning Edison, the great electrician, who, it is said, being lost for hours to his friends during a visit to the Fair, was finally discovered in one of these galleries eagerly devouring a large pancake spread with jelly.

In the Pennsylvania section, opposite the old-fashioned fireplace mentioned in the text, is an arm-chair with heavy wooden frame covered with corn-stalk, of which, it is said, 3,000 pieces were used, the stalks being cut in thin, narrow strips, and with ornamental designs. In the chimney corners are sprays of evergreens, with birds perched among the branches. What is the exact meaning of this fireside group of feathered songsters is not explained; but, as in love and war, everything is permissible at the World's Fair.

During the term of the Fair, vegetables in season and other perishable articles would be admitted, and, when necessary, might be replaced with fresh specimens under permit from the chief of the department, who reserved the right to remove such exhibits as were not properly cared for. In September there would be a special display of potatoes and other tuberous food-plants, and in October one of sugar-beets.

With exhibits of farm products must be forwarded, among other items, information as to the character of soil, the date of planting and harvesting, the mode of cultivation, the yield per acre, the price at the nearest home market, and the average temperature and rainfall



EXHIBIT OF MEAT PRODUCTS

between the time of planting and gathering the crop. For other branches of this department similar regulations were framed.

Dairy products would be received only between the 1st and 10th of June, July, October, and November. In making awards prominence would be given to the flavor of butter, for which would be accredited a maximum of 45 per cent, with 25 per cent for texture, 15 for color, 10 for salting, and 5 per cent for packing. So with exhibits of cheese, except for slight variations. The display of butter includes



STATUARY ON AGRICULTURE BUILDING

ordinary and fancy brands, with creamery descriptions, one package only to each exhibit, and of specified weight. Exhibitors of cheese were restricted to a single specimen, limited as to weight and size. American and Canadian articles must be made of full new milk, and were generally classed as cheddars, flats, young Americas, domestic Swiss, brick, and dairy, others being subject to special regulations at the discretion of the chief of department.

To provide for a uniform and sightly display of honey and beeswax were provided the glass cases mentioned in the text at the joint expense of state commissions, bee-keepers' associations, and individuals, in proportion to the space occupied by each. Specimens of comb honey must not exceed 100 pounds, and of extracted honey and beeswax each 50 pounds. Exhibits were also invited of domestic and foreign bee culture, whether by ancient or modern appliances.

Exhibits of wool were classified as pure-bred fine, pure-bred middle, pure-bred long, and cross-bred descriptions. Entries must consist of a single fleece as taken from the sheep in its natural condition, displays of Cashmere, Angora, Alpaca and Vicuna wools being subject to the same regulations as the rest.

Among the artistic phases of the agricultural display mention should be made of the miniature models of domestic animals in one of the galleries, the originals of which were copies from life by Max Landsberg. Horses, donkeys, mules, cattle, sheep and swine, are all moulded and painted in natural colors, and with marvellous fidelity of delineation. The originals are the property of the Imperial Agricultural university of Berlin.



WINDMILLS SOUTH OF AGRICULTURE BUILDING

Not far from the shore of the south pond is a miniature house surrounded by a broad veranda, and near it a plat of ground has been laid out in sections showing strata of crushed stone, soil, macadam, and other substances, arranged in regular layers. This is the exhibit of the National league of good roads, a young organization, but one in which substantial merchants, farmers, and others are largely interested, their efforts to secure better country roads meeting with favorable consideration from the United States department of agriculture. It was at first proposed to build a model road 1,000 feet in length, from the Forestry building to the Live-stock pavilion, but this project was abandoned in favor of the more condensed exhibit around the league's pavilion. Here sections of road are shown whose beds, varying in thickness, are constructed of macadam covered with fine stone and sand, and those whose principal material is stone. Highways are also arranged in forms best suited for wet and dry lands, for clayey or sandy soils.

By several firms to whom were granted concessions to sell confections and beverages upon the grounds, ornate pavilions were erected. Among the most elegant is that of the Lowney company, of Boston, manufacturers of chocolate bonbons, whose structure is near the Manufactures building, while the most unique is that of the Blooker cocoa company, a quaint reproduction of an ancient Amsterdam mill, located on the shore of the south pond. It was during the early portion of the present century that two brothers of the Blooker family established this business, the windmill now represented at the Fair then grinding the cocoa beans into the product which has since acquired an excellent reputation. Adjoining the mill, or rather forming a portion of it, is a Dutch house of the old style, built and furnished to illustrate the surroundings of a burgher of moderate means, and refined tastes. The furniture and pottery are essentially Dutch, and of superior quality, and there are girls who serve the cocoa dressed in the national costumes of the Netherlands as worn in early days. Very noticeable, also, among the chocolate booths is that of Menier, the French manufacturer, which, in its dress of white and gold, stands south of the entrance to the Mines and Mining building, and within the court of honor.

A picturesque display in connection with the Agricultural department is the collective exhibit of windmills, mainly by Illinois, Iowa, Ohio, Indiana, and Michigan factories, and grouped around the shores of the south pond, between the intramural road and the buildings of the French colonies.

Among the larger collections of mineral waters in the galleries of the main hall are those from Waukesha, Wisconsin, arranged in



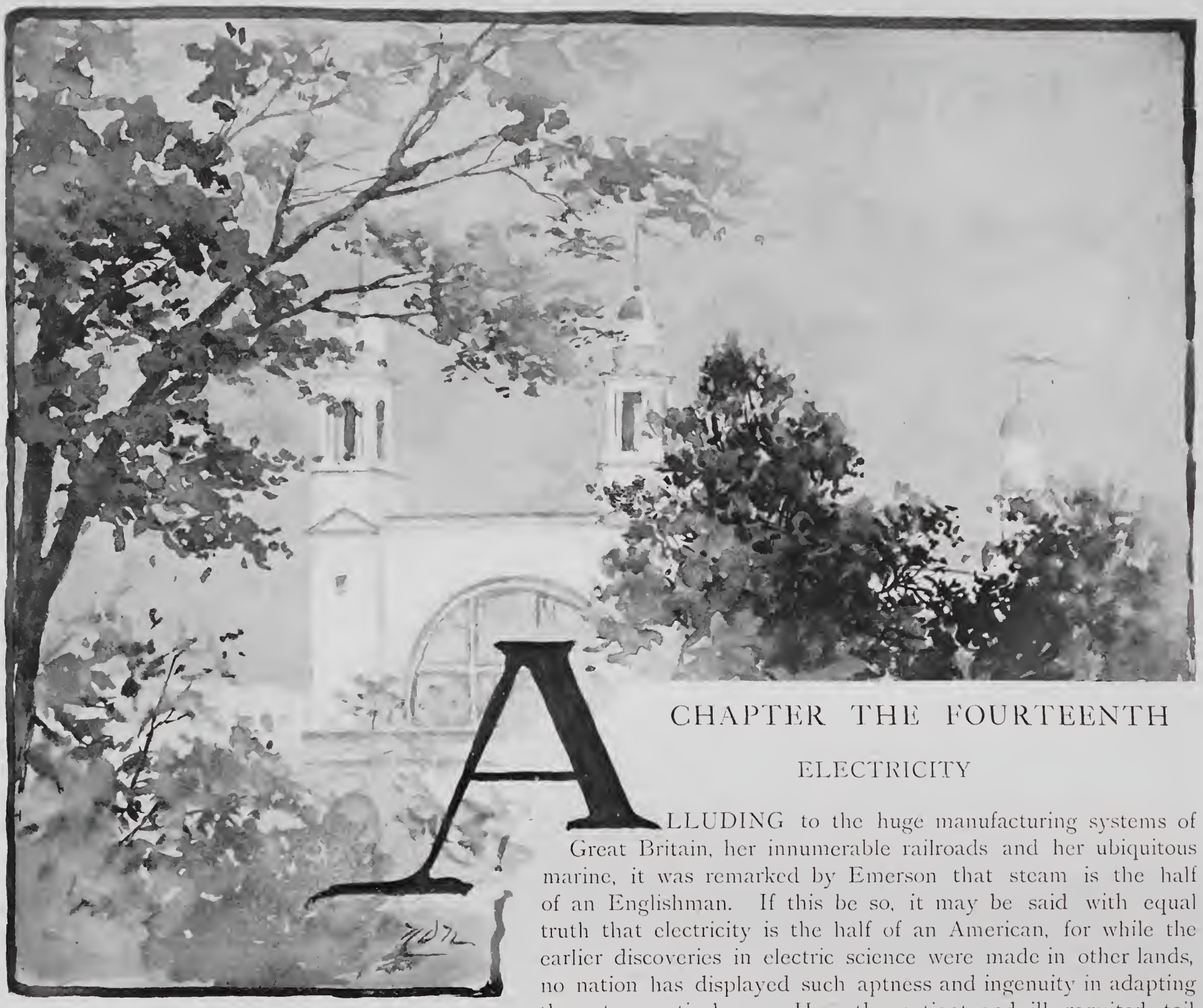
OLD-FASHIONED CANADIAN PLOUGH

the form of gigantic bottles; but the real exhibit is distributed over the entire grounds. To the Waukesha Hygeia company was awarded the concession for supplying visitors with mineral water, and for this purpose stands were erected both in grounds and buildings. The water was pumped from the source of supply in Wisconsin, and near the terminal railway station the company erected a power house and a pavilion of unique design, its main entrance in the form of a court, containing an ornamental basin, into which the water is forced, still bubbling and sparkling. Thence it is conveyed in pipes to its many points of distribution, and sold at the rate of one cent a glass.

In the rear of the Anthropological building are two unique exhibits by Louisville manufacturers of whiskies, each of whom claims to produce the real old-fashioned article by modern methods. One of these firms has erected a log hut, or moonshiner's cabin, with imitation mud plaster between its timbers, and with pieces of glass or crockery inserted as ornamental features. Inside, however, the parallel is not faithfully developed. Floors and walls are of the finest wood, and sour mash and rye are displayed in most seductive forms. The so-called Old Times distillery company has a commodious two-story distillery in actual operation, with bonded warehouse, and a United States gauger's office within. Whiskies labelled Old Times, Kentucky Comfort, Gladstone, and others, are exhibited in the room containing the stills. On a placard prominently displayed the visitor is warned not to ask too many questions on pain of having some of them unanswered.



ILLUMINATION OF THE COURT OF HONOR

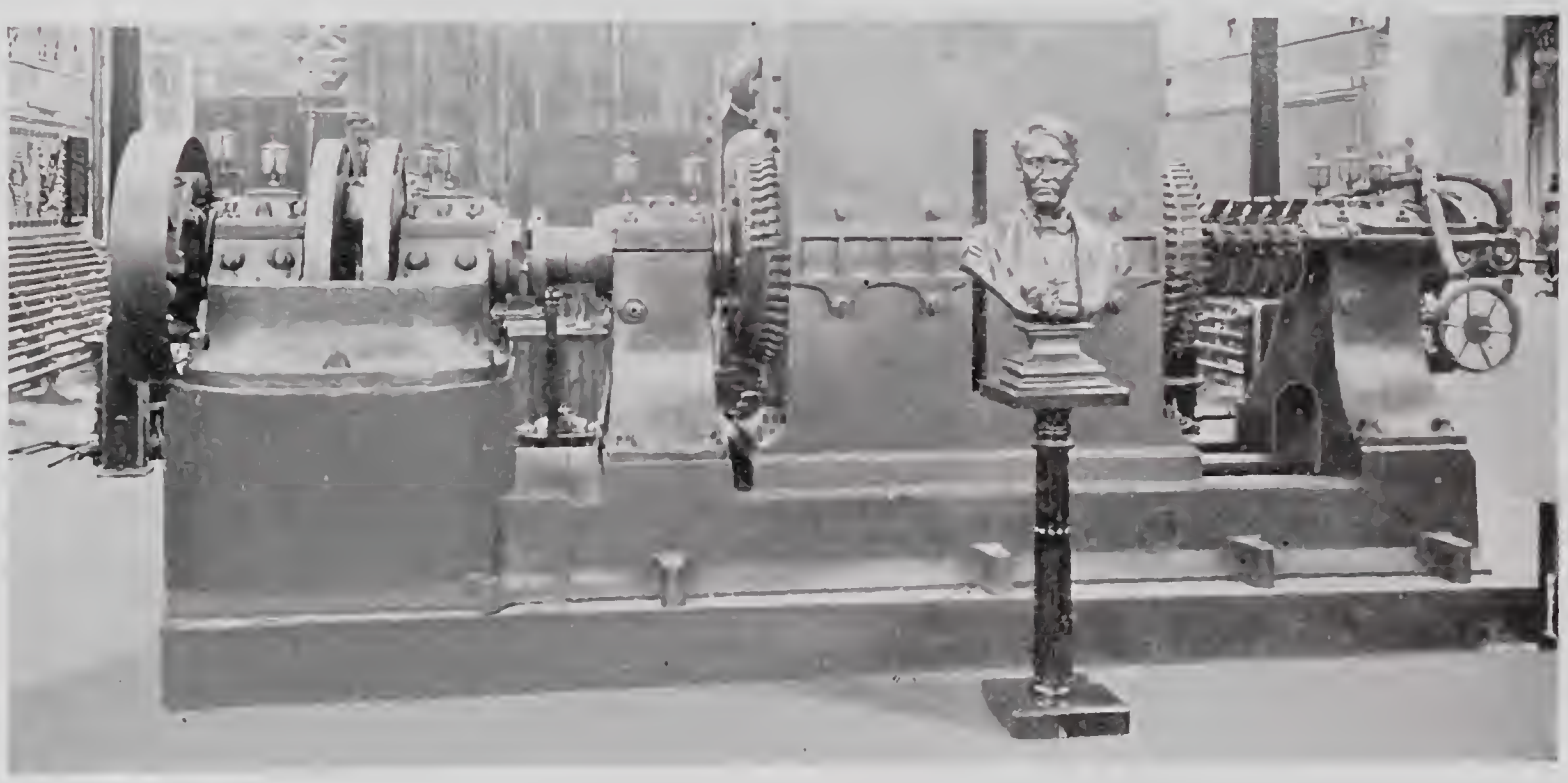


CHAPTER THE FOURTEENTH

ELECTRICITY

ALLUDING to the huge manufacturing systems of Great Britain, her innumerable railroads and her ubiquitous marine, it was remarked by Emerson that steam is the half of an Englishman. If this be so, it may be said with equal truth that electricity is the half of an American, for while the earlier discoveries in electric science were made in other lands, no nation has displayed such aptness and ingenuity in adapting them to practical use. Here the patient and ill requited toil of Samuel Morse has fructified into a network of telegraph lines, which carry the tidings of the world with the swiftness of thought to every section of the republic; here was conceived the plan for the first of our submarine cables, and here was invented the telephone, by means of which many millions of spoken words are carried daily over the wires. And so with apparatus for lighting, motion, the transmission of power, and other purposes, our electric lamps and dynamos, our motors and cars being now exported to every quarter of the earth.

And yet to-day we know no more of what electricity is than did Theophrastus or the elder Pliny, both of whom speak of the property of amber for attracting such light substances as straws and leaves. We have learned that it is not a fluid, as was formerly supposed, that it is not matter, any more than are light and heat; but when we say that it is a force, or rather the cause of a force, we have said about all that has thus far been discovered as to this the most puissant of nature's potencies. It is not until recent years that electric power has been applied to practical purposes apart from the telegraph, or indeed was supposed to be capable of such application. In 1882, for instance, was opened the first central station for lighting streets and buildings; in 1893 there were nearly 1,300 stations with 2,500,000 lamps. In 1881 the first isolated plant was erected on the shore of Blue Mountain lake; in 1893 there were 3,500 isolated plants with 1,443,000 lights. In 1885 was built the first electric railway, with its mile or two of track;



EDISON'S APPARATUS



THOMAS A. EDISON

in 1893 there were 435 electric railways in operation, with 5,000 miles of track and 8,500 motor cars. In many steamship lines on ocean, lake, and river vessels are lighted by electricity, while in warfare, in mining, metallurgy, mechanics, and in the transmission of power for various purposes, it is rapidly coming into use. All this is fully illustrated at the Fair, where electricity is almost ubiquitous, for there is hardly a corner of the buildings or grounds where its agency is not manifest in one form or another.

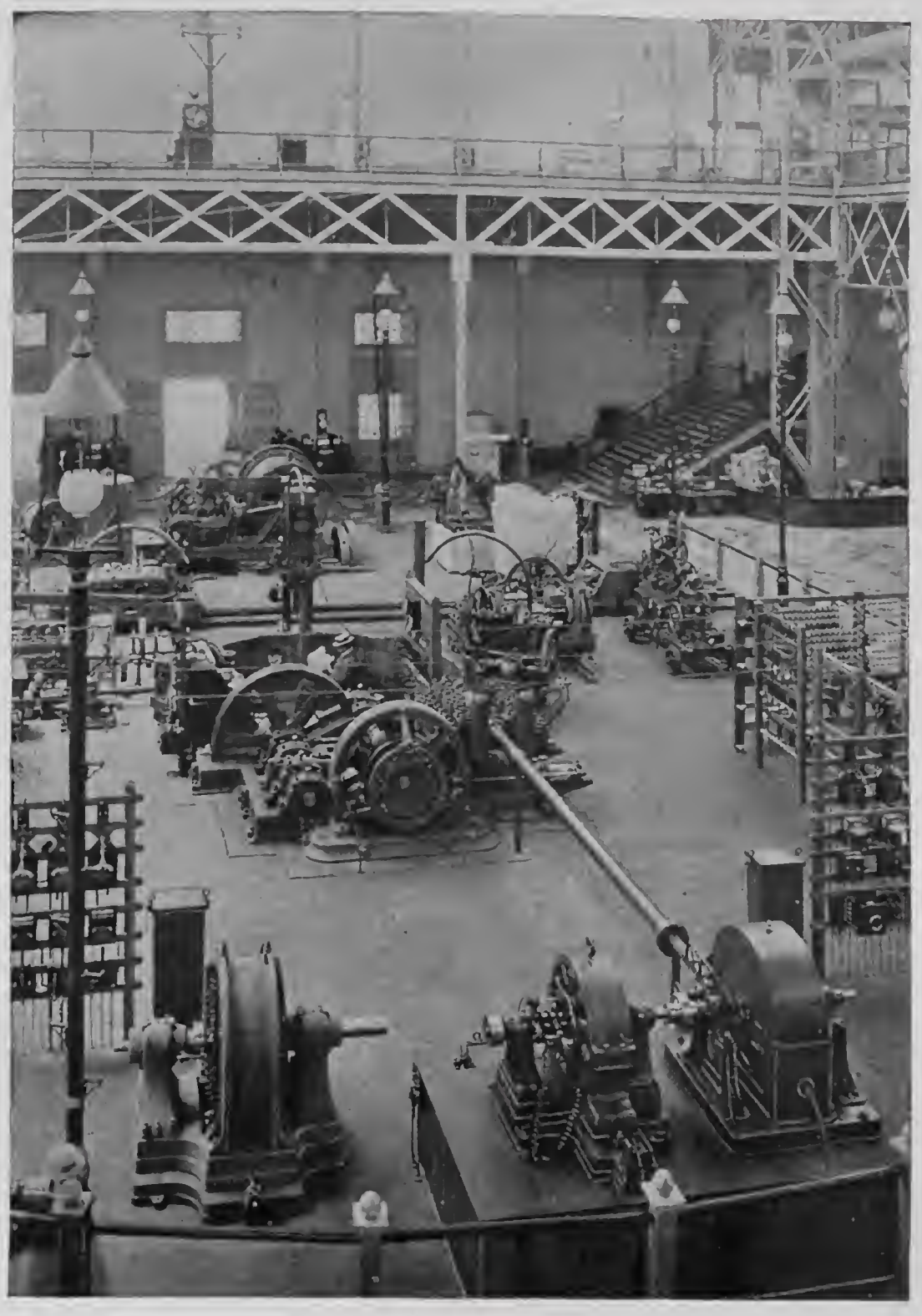
To the majority of Exposition sight-seers the most attractive feature in connection with the department of Electricity is the illumination of grounds and buildings, of fountains and waterways, forming, with the play of search-lights, a more striking illustration of the wonders wrought by this science than any mere collection of machinery could possibly be. The decorative lighting of the grounds is concentrated chiefly on the main plaza, the shore line of the central basin, its border of flower beds, and the cornice lines of the buildings rising to a uniform height above the court. The outer surface of the Administration building, with its dome and corona, are also traced in lines of light. Elsewhere exterior illumination is restricted to the Wooded island, to loggias and colonnades, to Festival hall and the terminal railway station.

As to interior illumination, the following description by the chief of the department may be of interest:



LOOKING SOUTH FROM CENTRE OF HALL

"The two problems of lighting, by far the most difficult presented, have been the lighting of the Art galleries, with their two miles of reflecting screens, and the lighting of the dome of the Administration building, which is larger by far than the dome of the capitol at Washington. On the floor of this dome, which is octagonal, there are in the eight angles as many great spreading candelabra of special and beautiful design, each bearing 50 lamps. High up, at the spring of the interior dome, is a gallery running clear around it. The gallery has a metal railing, and upon this railing are 56 seven-light standards, forming a great corona of light 120 feet in diameter. Far up above, and through the opening in the top of the false dome, is seen the beautiful painting upon the ceiling of the outer dome, as illuminated by a circle of arc lights which are themselves hidden from view between the two domes.



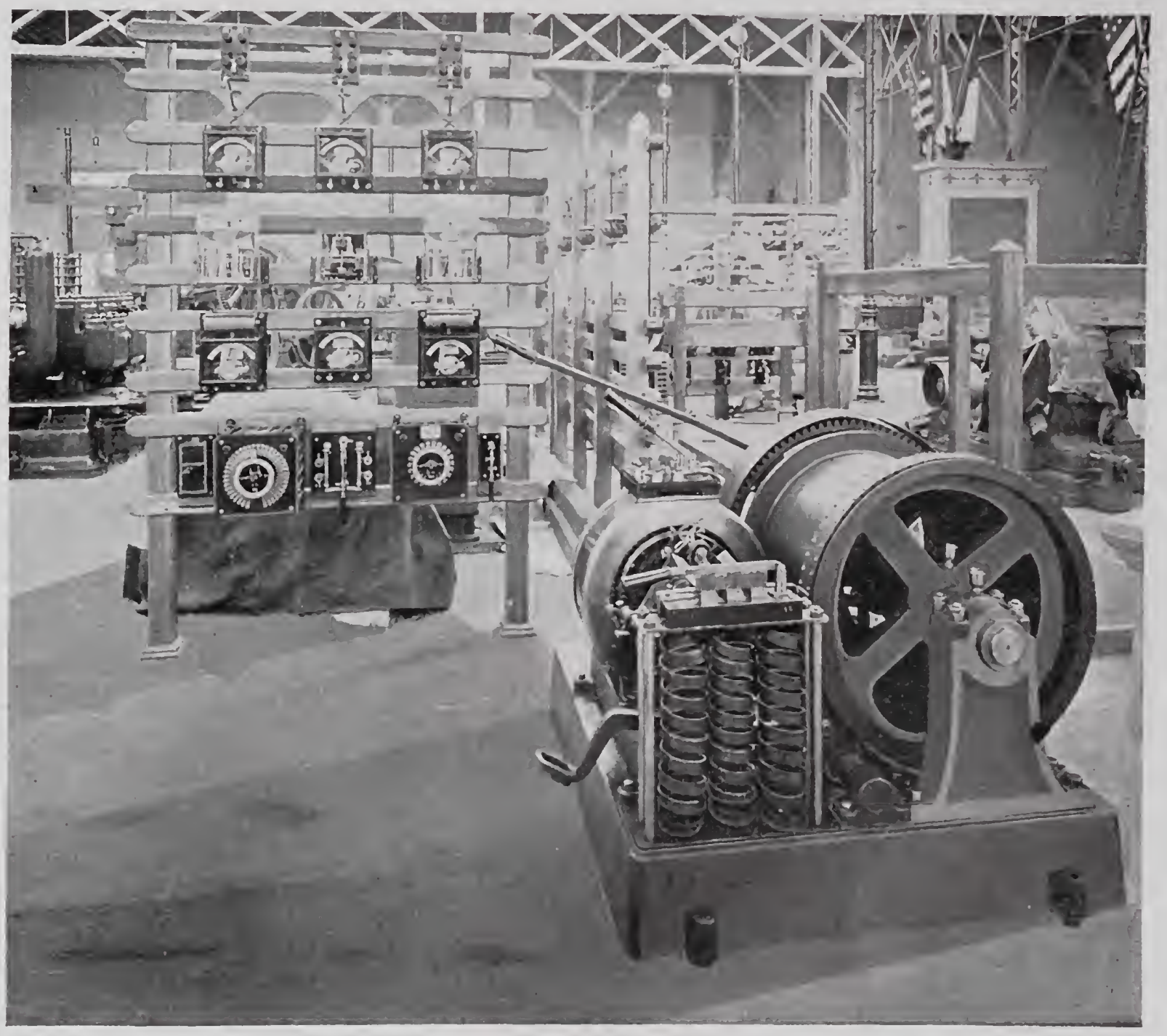
VIEW IN ELECTRICITY HALL

"An effective piece of lighting appears in the Fisheries building. The large circular pavilion upon the east is used as an aquarium. Around the building are arranged continuous concentric rows of great tanks. The sides of these tanks are of clear glass, and are continued in the ceiling by stained glass screens, so that the observer walks in a covered corridor the sides of which are of glass, and through which can be seen the representatives of all the finny tribes disporting themselves in their native element. No lights are visible; but the tanks are lighted by hundreds of incandescent lamps placed under screens above the tanks, so that the light does not strike the eye, but is diffused throughout the water, which is illumined as effectively as at noonday."

In the illuminated city of the Fair the attraction is not in the myriads of arc and incandescent lamps, with their elaborate settings, nor in the circular electroliers, some of them suspended, as in the hall of Manufactures, 150 feet above ground. Rather is it the part that each one plays in the general effect, the special feature that its light accentuates, all contributing to give to this wondrous display the aspect of a veritable fairyland, to raise it, for the moment, almost beyond the realm of matter.

Let us imagine ourselves standing at eventide in the central court, now almost a solitude, haunted by the shadows of deserted temples cast athwart the plaza. Toward the east darkness is settling over the waters of the lake. Northward and to the west a heavy pall of smoke broods over the great midcontinent metropolis, and far to the south the lurid flames of a blast furnace are faintly visible on the dusky horizon. Suddenly a beam of light shoots like a falling star from the lofty dome of the Administration building, and a moment later its symmetrical outlines stand out in tracery of fire. At its base is a circling wheel of light, and a hundred torches further relieve the black abyss beyond. Meanwhile a thousand lamps, clustered around the central avenue, have turned the night into day. Thus also the other great buildings that encircle the court assume their robes of light, with pillars, porticos, and colonnades blending in weird, yet brilliant perspective, like the threshold of an enchanted palace.

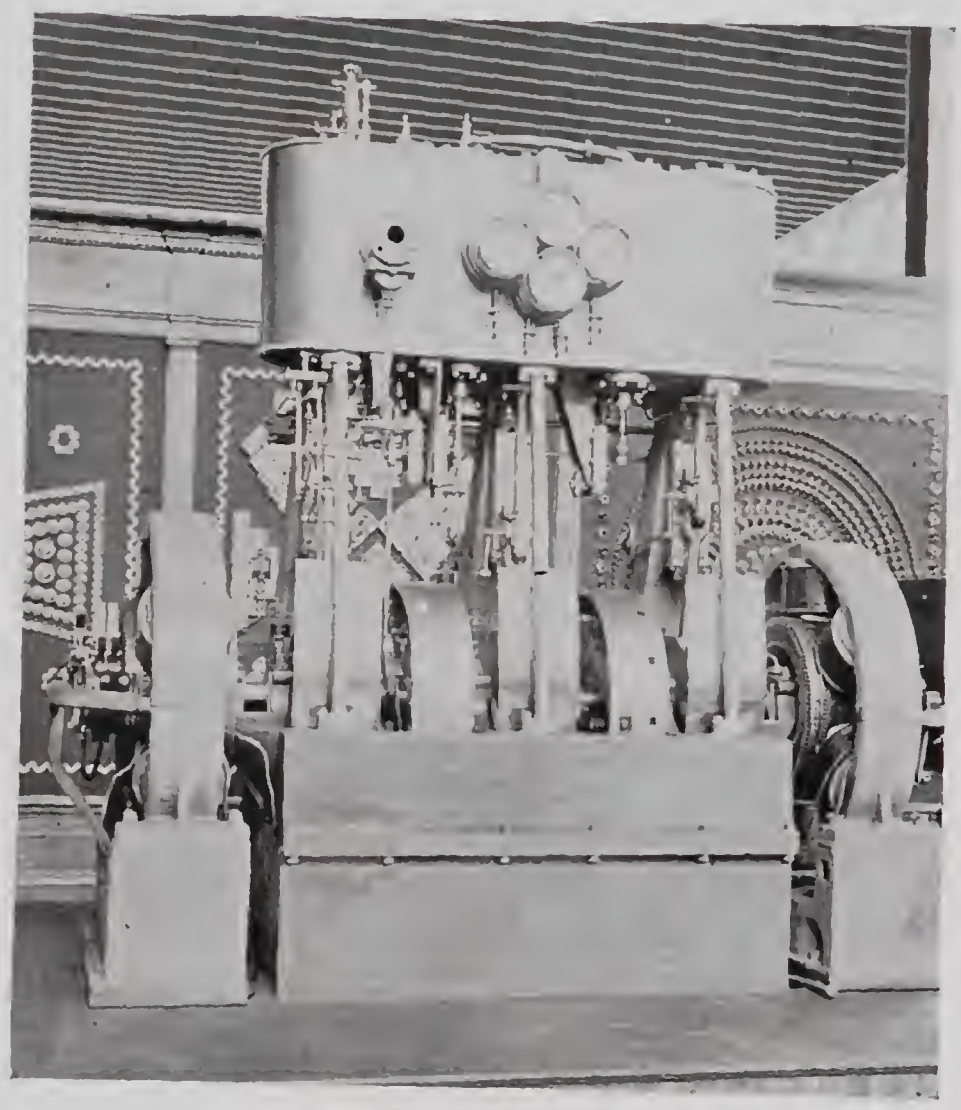
From the summit of the Manufactures building a pyramid of dazzling light is cast on the dome of the Administration building, throwing into strong relief its delicate tracery of gold and white. Then in swiftly changing streams of white, green, and blue, purple,



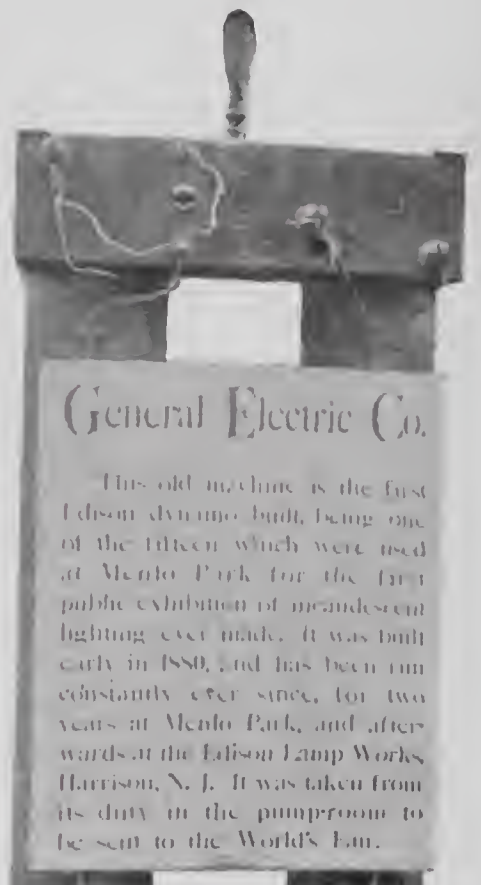
GROUP OF EDISON MACHINES

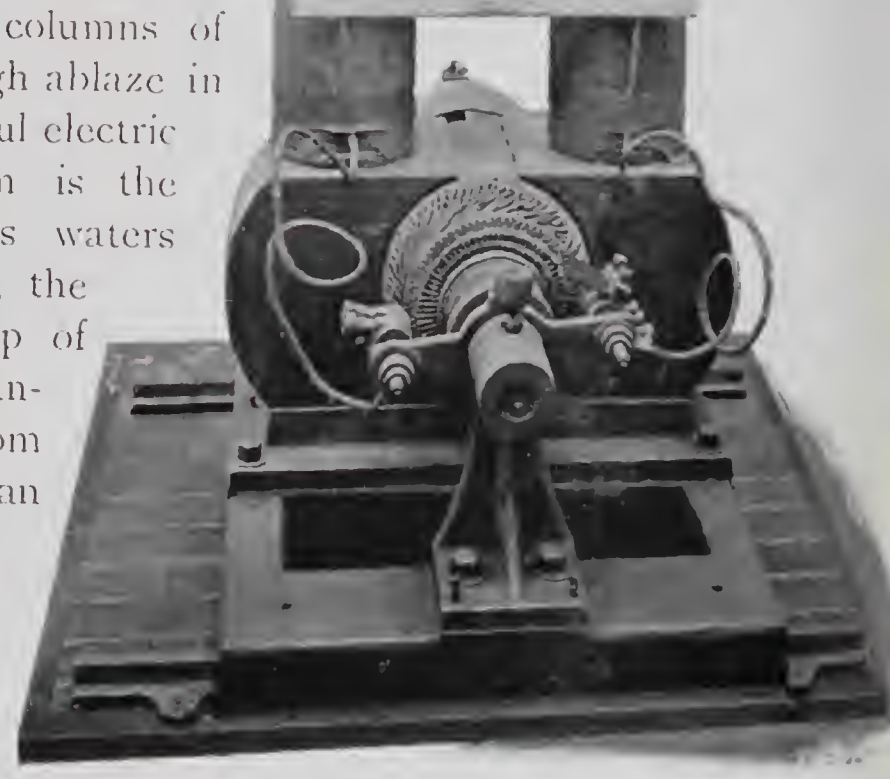
yellow and scarlet, three search-lights are turned simultaneously on the central court, the basin, the MacMonnies fountain, and the statuary here displayed in lavish profusion. In the heroic statue of the republic, with its background of double columns shining like pillars of Carrara marble, every inch of its golden surface glitters beneath the piercing rays. Presently the search-lights sweep the horizon, one of them resting for a moment on the graceful figure of Diana, poised against the sky as though suspended in mid air. Another is turned toward the lake, casting its bright sheen on the waters of Michigan, and striking the sails of a passing vessel, whose white wings slowly vanish from sight. Gradually the scene grows warmer in its wealth of coloring, and the lights and shades more intense in contrast, the copses and groves of wooded island, with its garb of verdure, throwing their shadows across the tracery of fire.

But the climax of all this brilliant display is in the electric fountains at the head of the lagoon in front of the Administration building. Here are light effects of surpassing loveliness, in rich varying hues, sprays, jets, and columns of water appearing as though ablaze in the glow of these powerful electric currents. Between them is the MacMonnies fountain, its waters iridescent as the rainbow, the centre-piece with its group of figures resembling a phantom ship with phantom crew, beautiful but with an unearthly beauty. Under these changing colors the vessel seems to float, now on a sea of white, and again on a rose-colored expanse, on frosted silver or on molten gold. Near by gondolas and electric launches speed swiftly to and fro across the lagoon, breaking its resplendent surface into a thousand glittering fragments, while from the plaza strains of music are wafted into the still night air, and above all is heard the ceaseless murmur of the waves, breaking on the shore adjacent, as with the low sad monotone of ocean.



MULTIPLEX GENERATOR





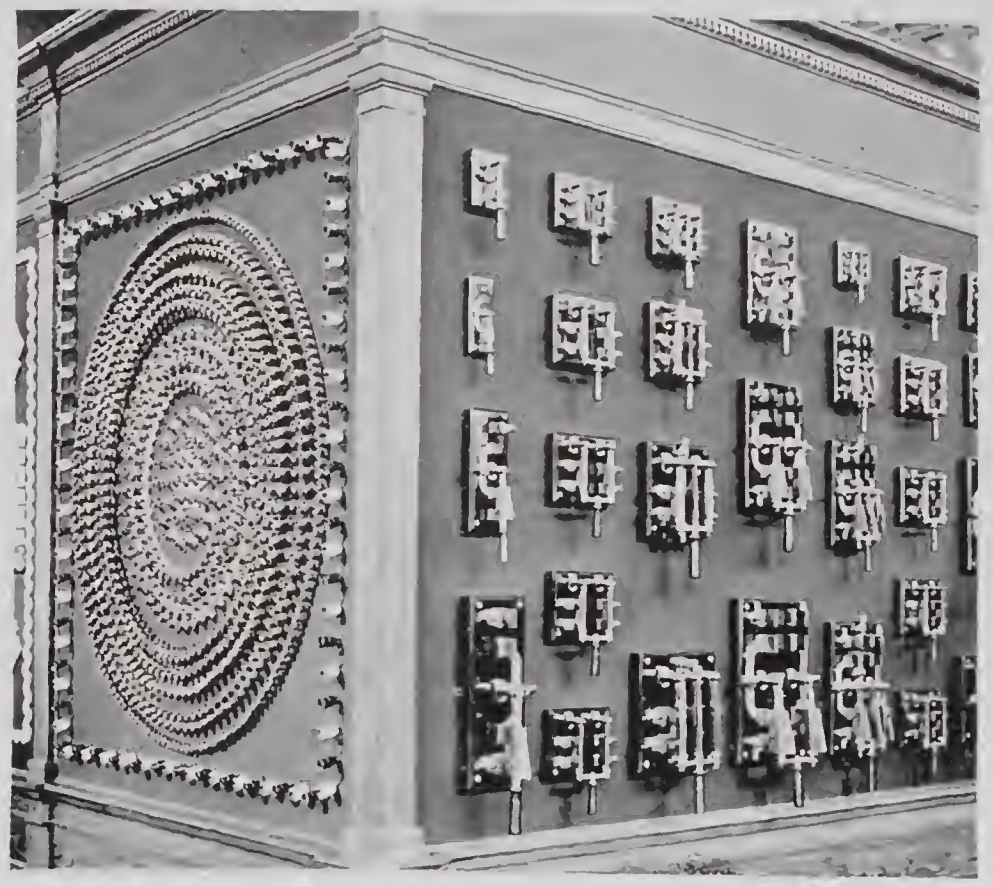
Such is the entertainment offered by night at the Fair, but on no two nights alike, presenting a new combination of brilliant effects at each illumination, and varied at times with fire-works, the latter, as it would appear, somewhat out of place amid this marvellous scenic display, and more than once threatening serious disaster to the Exposition buildings and their rich contents. No wonder that these artistic glories of the night, surpassing even the spectacular marvels of the day, brought visitors to the grounds by scores of thousands, and to the management a goodly increase of revenue. Under the glow of myriads of lamps the architectural symmetry of the design is displayed to excellent advantage, the uniform cornice level of the buildings, sixty feet above ground, standing clearly forth in tracery of incandescent lights, while encircling the basin near its water level an unbroken circle of vari-colored jets, each reflected from its glittering surface, gives to the scene a brilliance almost too dazzling for human eye to rest upon.

From this brief description of the Fair by night let us turn to the exhibits proper of the department of Electricity, for here also are many attractions for every class of visitors. While some portions of the Exposition are largely occupied with technical collections, such as are of special interest only to those with whose business or studies they are connected, here is one that represents the greatest and yet the youngest and most progressive of the sciences, one whose marvels, though surpassing the wonders of dreamland, are presently to be excelled by others yet in store.

Passing from the railway station along the northern side of the central court, the visitor will observe in the spacious portico of a building on his left, a colossal statue mounted on



WIRING APPARATUS



INCANDESCENT APPARATUS

In describing this gem of artistic workmanship, with the façade to which it gives emphasis, I cannot do better than adopt the words of one of its artificers, Henry Van Brunt, of the Kansas City firm of Van Brunt and Howe, to whom I am partially indebted for my sketch of other Exposition buildings.

"On the south side," he says, "it was necessary to make a concession to that spirit of grandeur and ceremony which should prevail around the great court of the Exposition. Accordingly the vertical line, predominant elsewhere in the building as a foil to its long, low, horizontal mass, is here subordinate to the spirit of repose. To this end the campaniles on the corners are set back from the front, but connected with it by gabled pavilions, and the principal entrance on this side is treated as a triumphal arch, crowned with a classic pediment containing an escutcheon, which bears the electro-magnet as a symbol of electricity, and is supported on each side by a female figure representing the two principal industries connected with this science—electric lighting and the telegraph. Above, in contrast with the somewhat fantastic movement of the skylines elsewhere, rises a solid elevated attic, forming a severe horizontal outline against the sky. This central mass is buttressed on each side by great consoles, supporting emblematic statues resting on pedestals, and embellished with medallions of Morse and Vail, the American inventors of the electric telegraph."

a pedestal, and on the frieze above it the following inscription:

Eripuit Cœlo Fulmen Sceptrumque Tyrannis.

In the statue he will recognize that of the great philosopher who, if he did not, as the epitaph would have us believe, wrest from the tyrant his sceptre, was the first to steal from heaven its lightning. Passing through the portal and beneath the arch which encircles it, we find ourselves in the hall of Electricity, an edifice somewhat daring in design, but with such elements of the picturesque as its special uses would permit. Before making further mention of this structure, let us pause for a moment within its portico, for here is one of the main architectural features of the composition.



EDISON DYNAMO

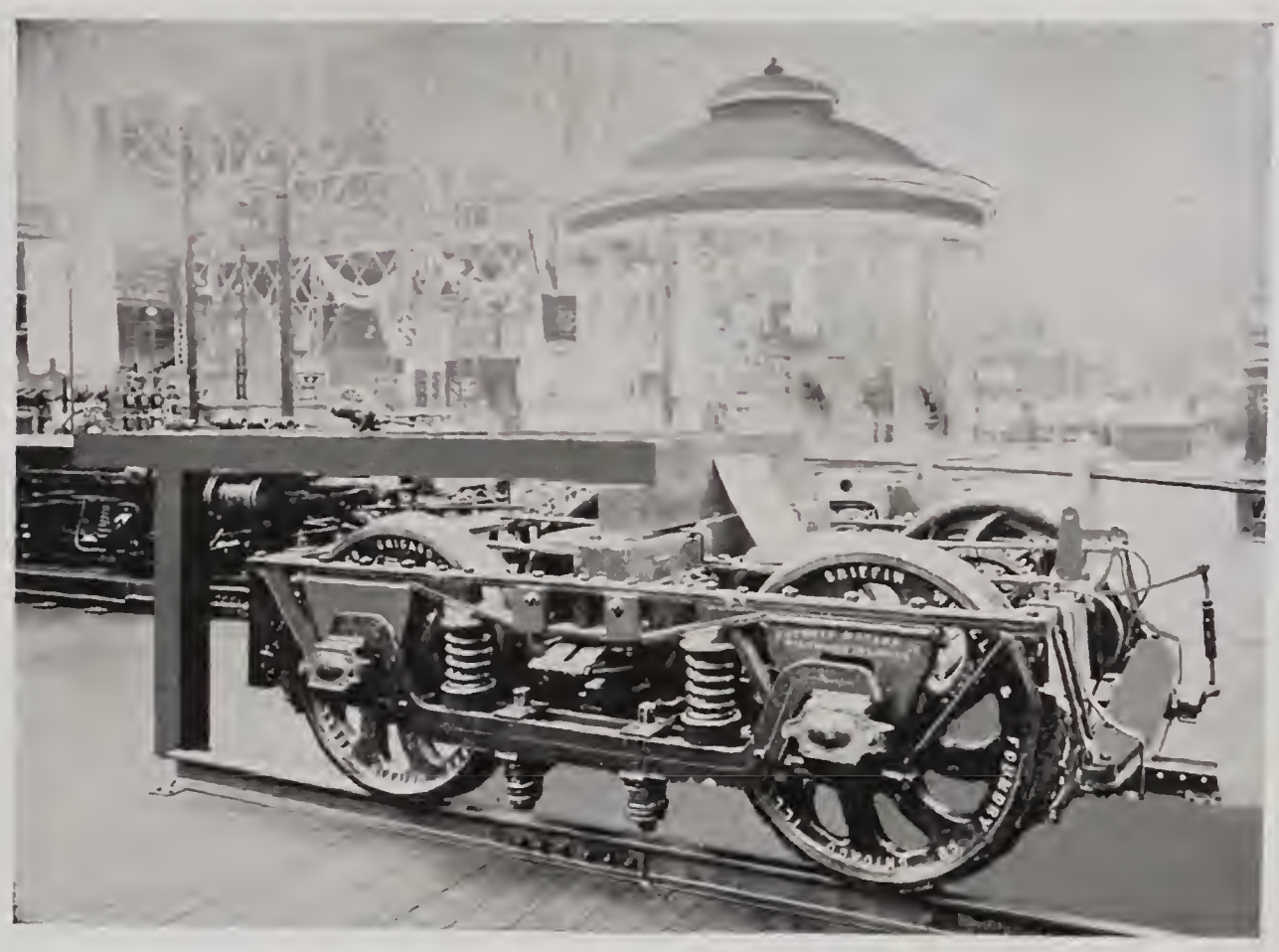


ELECTRIC ELEVATOR

In the centre of the great portal is the statue of Franklin, by Carl Rohl-Smith, fifteen feet in height, and one of the best conceptions ever presented of the great discoverer, his gaze turned upward toward the lowering clouds, in one hand the kite, and in the other the key of which all the world has read. Upon the frieze are inscribed in alphabetical order around the building the names of more than threescore electricians of all nationalities,

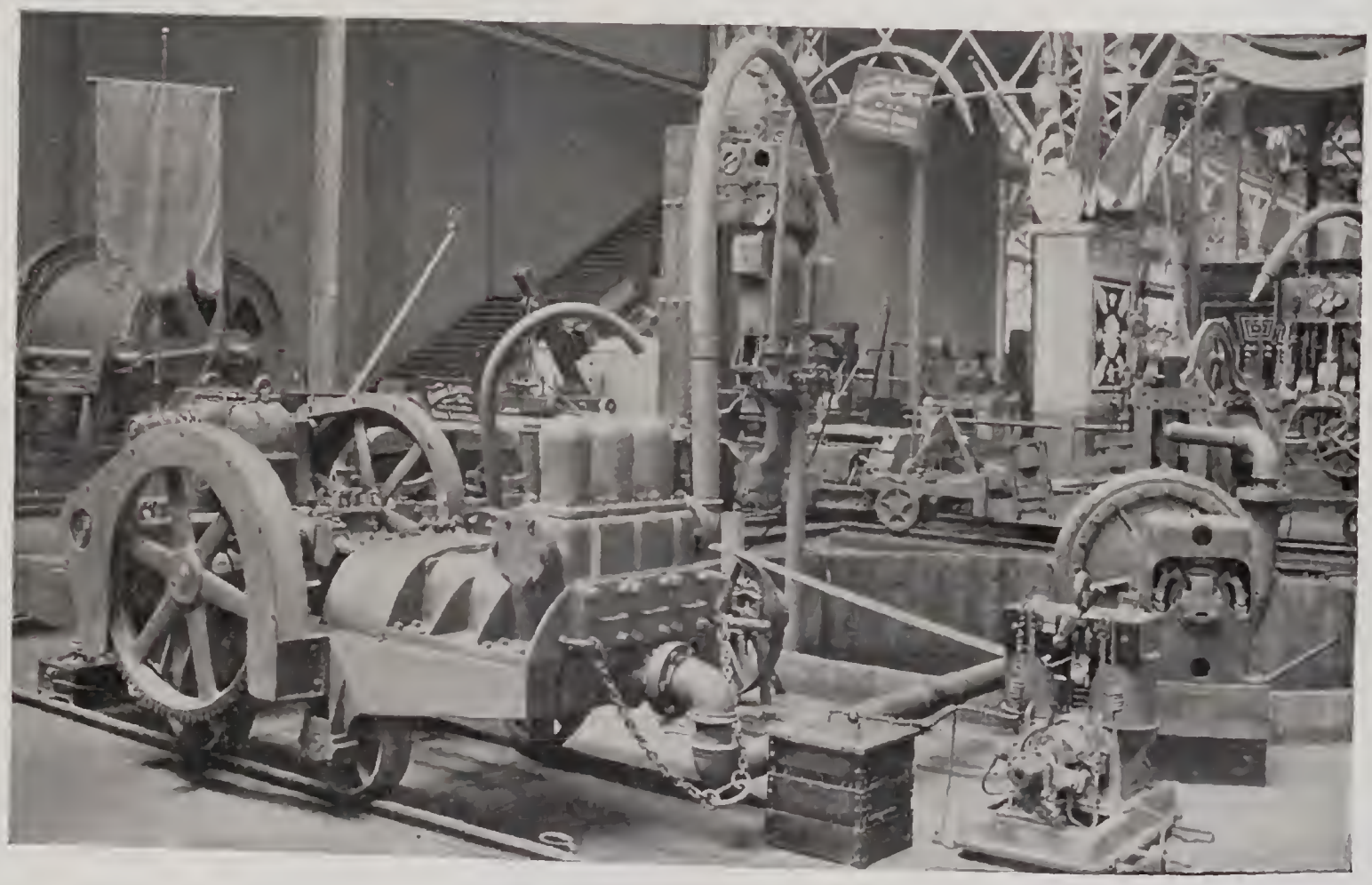
whose names have become historic, the fame of those who are still among the living resting upon the exhibits within.

In preparing the plan of the Electricity building a space of twenty-three feet was adopted as the unit of measurement, fifteen of these modules forming the interior width of the building, and five that of the longitudinal nave which forms its central feature, the latter intersected by a transept of equal width and height. On each side of the nave are aisles, one module in width, and above is a series of galleries connected by bridges, and to which access is afforded by spacious stairways on either side of the principal entrances. To provide for the central areas occupied by nave and transept, both are unencumbered with columns, their pitched roofs being supported by arched trusses of sufficient height to admit of clear-story windows, and with a range of skylights at the foot of the pitch. Flat roofs with skylights cover the remainder of the building.



EDISON STREET CAR MOTOR

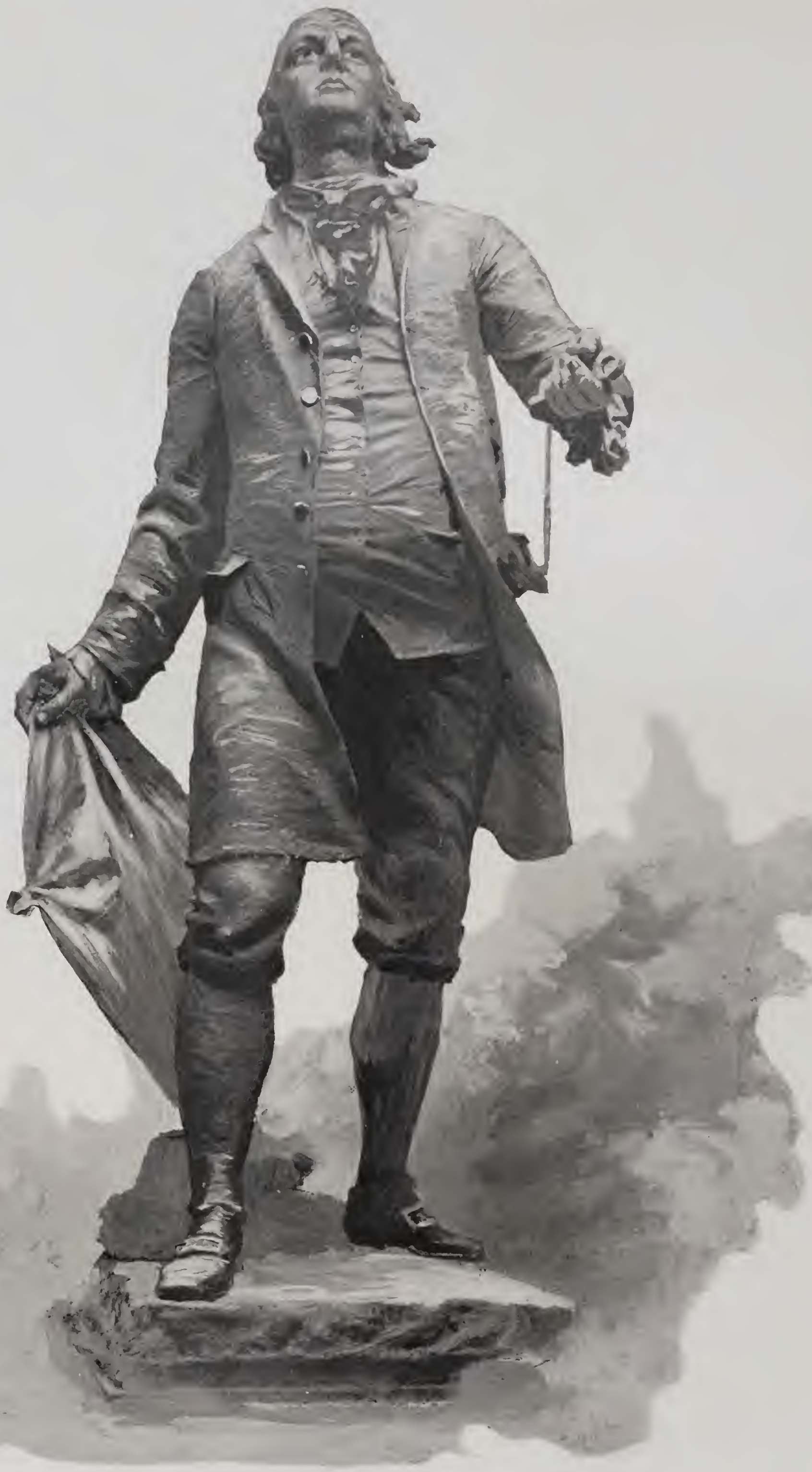
The area of Electricity hall, apart from galleries, is little more than five acres, fronting on the main court 350 feet, and extending about twice that distance length-wise toward the lagoon. Hence in this structure, small by comparison with its neighbors, but only by comparison, it was a part of the design to give to it such features as should mask its inferiority of size. But this could not be secured by giving additional height to the curtain walls, which must not exceed sixty feet from ground to cornice. The bays were therefore fashioned so as to furnish at frequent intervals bases for towers, and between them pilasters of the Corinthian order, projecting boldly from the piers, and ending in pedestals supporting banner-staves, which served also for a continuous series of electric lights. Further to emphasize the vertical lines of the building, in the centre of its two longer façades the intercepting transept ends in a pavilion, flanked with towers, upon which rests an open belvedere with rounded attic, supporting a cupola, and ending in candelabra of electric lights reflected from the overhanging canopy nearly 200 feet above ground. In front of the pavilions are porticos, with columns more than forty feet high, and also of the Corinthian order. On the north side, where the proximity of the lagoon permits more freedom of style, the portal is placed midway between two semi-circular projections, the towers on either side resembling those of the east and west pavilions, while on the panels of the arch are recumbent figures typical of discovery and investigation. Elsewhere the decorative scheme suggests the purposes to which the building is devoted, helping with the tall campaniles and their intermediate domes, to relieve a too strict conformity to classic models.



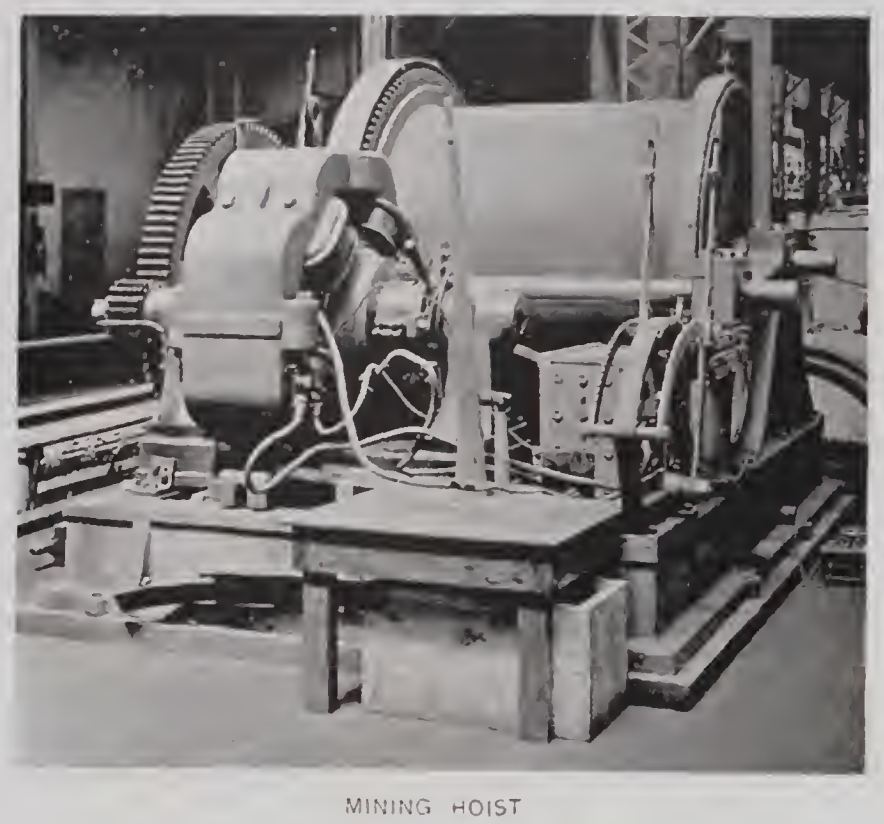
MINING PUMP

While the main object of the Electrical department, contained for the first time in a building of its own, is to display, with competitive tests, the working of electrical apparatus in practical use, it is also intended to present a history of this science from its very inception, with models, and in some instances the actual appliances used by the earlier inventors. Of the plant located in Machinery hall mention has already been made, and in addition to lighting its power is applied to manifold purposes, among them for the operation of an elevated railway within the grounds, for mining, milling, and metal work, for exhibits of electricity used for artistic effect, and in a word for all the wide field in which electric science has gained a permanent foothold.

Says the chief of the department: "The general scheme to be carried out is twofold. The exhibits will be practical, and they will also be popular. Every electrical concern and enterprise of any importance in



THE FRANKLIN STATUE



MINING HOIST

the world will be represented. By means of the practical arrangement of the exhibits, by means of their scientific classification, covering the entire field of electrical science, by the opportunities afforded to compare the results of the more prominent electrical systems in supplying electric service for light, power, heat, and commercial purposes, with each of these different systems in actual operation, side by side, and almost under identical conditions, great popular object lessons will be presented, which will not only be intensely interesting to the eye and sense, but will also be highly educational to the electrical engineer, the central station manager, the manufacturer, the student, and the public in general. The final object is the enlightenment of the people as to the progress of a branch of science and industry yet scarcely out of its cradle, and to foreshadow the possibilities of its future."



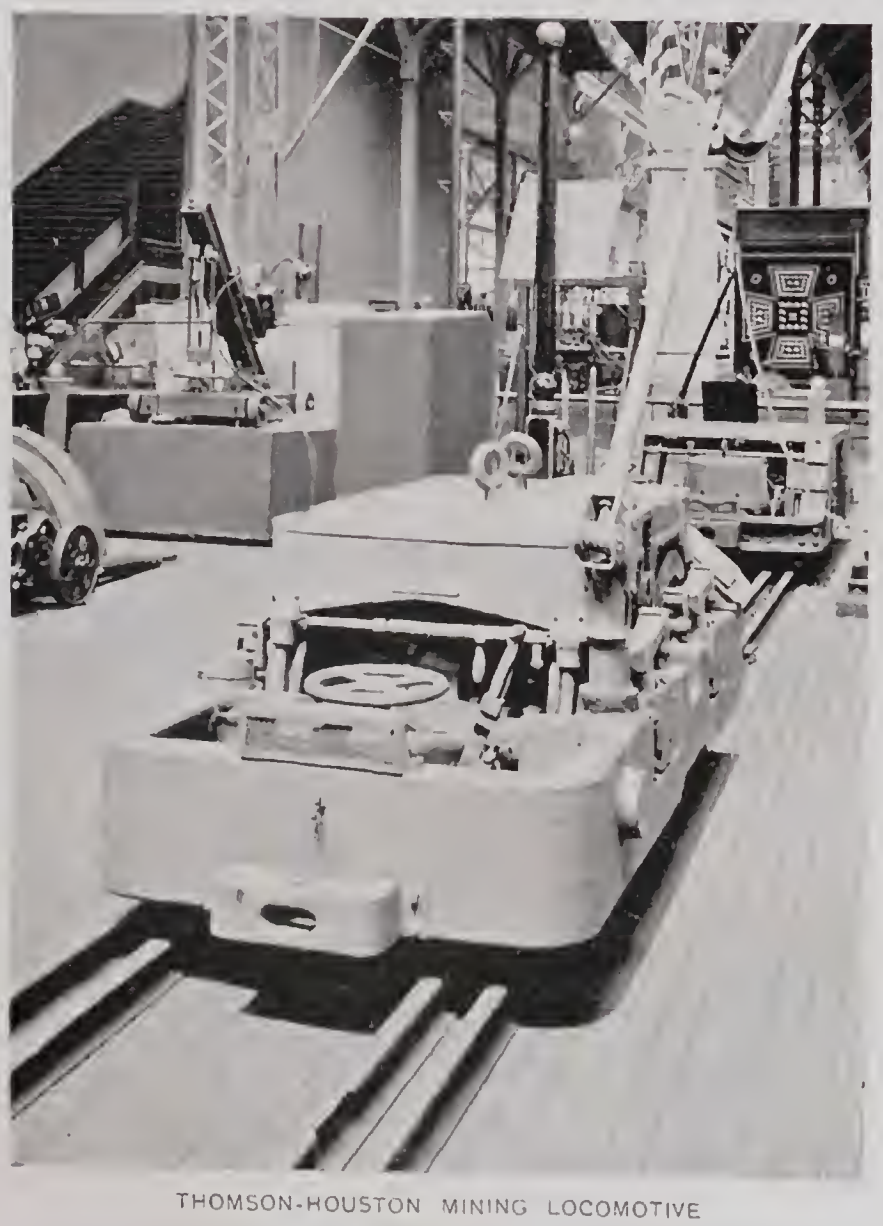
ELIHU THOMSON

In the centre of the building, and forming a part of the exhibits of the General Electric company, is the Edison tower, the so-called tower of light, its shaft encircled by thousands of miniature lamps, arranged in unique design, and with kaleidoscopic effect. Above it is a large incandescent lamp or series of lamps, composed of innumerable pieces of crystal, and at its base a pavilion, surrounded by a circular peristyle, and containing a number of electroliers and globes exhibited by a Pittsburg company, these also illumined at night by electricity. Thus when, at the silent touch of an unseen hand, the tower from base to apex is arrayed in robes of scintillating and many colored lights, we have here the very incarnation of electric science.

In the company's display are illustrated nearly all the uses to which electricity is put, their collection including machinery and apparatus of every description from the smallest of lamps to the most powerful of dynamos, and from electric toys to motors and motor cars. West of the tower of light is a section containing 2,500 specimens of Edison incandescent lamps, such as are made at the company's works at Harrison, New Jersey, and as declared by the highest courts of justice in Europe and the United States, the only lamps that are lawfully manufactured. Lamps are also shown in different stages of construction, illustrating the experiments of the inventor from their first inception to the perfected mechanism of the present day. In one of the compartments is apparatus for decorative purposes, so arranged that the quantity of light consumed can be regulated and registered by meters. In this section also is the first dynamo for incandescent lighting constructed by Edison in 1880 at his works at Menlo park, and near it is one of the dynamos used, some ten years ago, at a New York station of the Edison Electric Illuminating company. Though both are now somewhat out of date, they were regarded at the time as among the marvels of the age. The isolated incandescent lighting systems, such as are adapted to the use of hotels, theatres, and large business buildings are shown in a separate group.



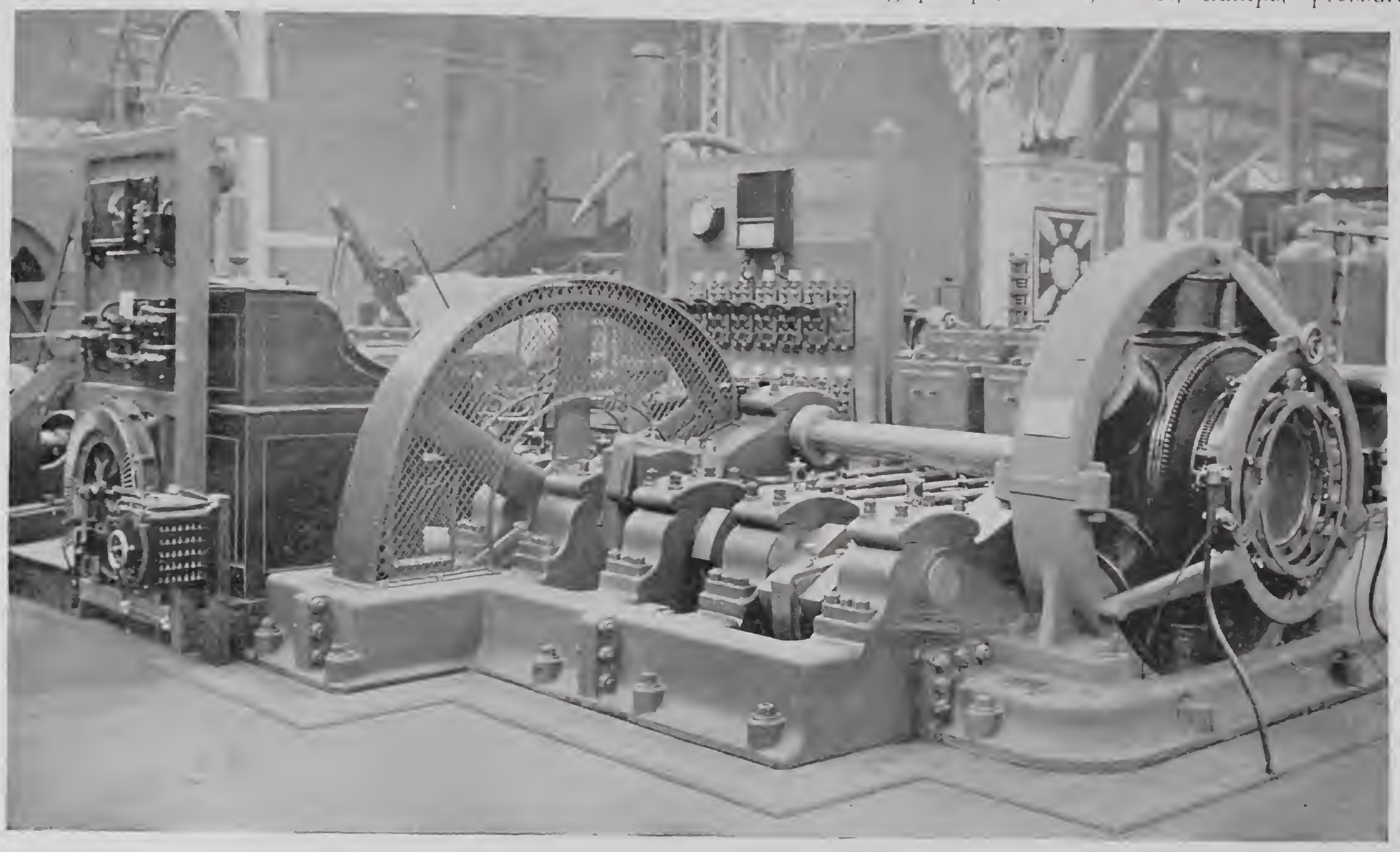
DRILLING BY ELECTRICITY



THOMSON-HOUSTON MINING LOCOMOTIVE

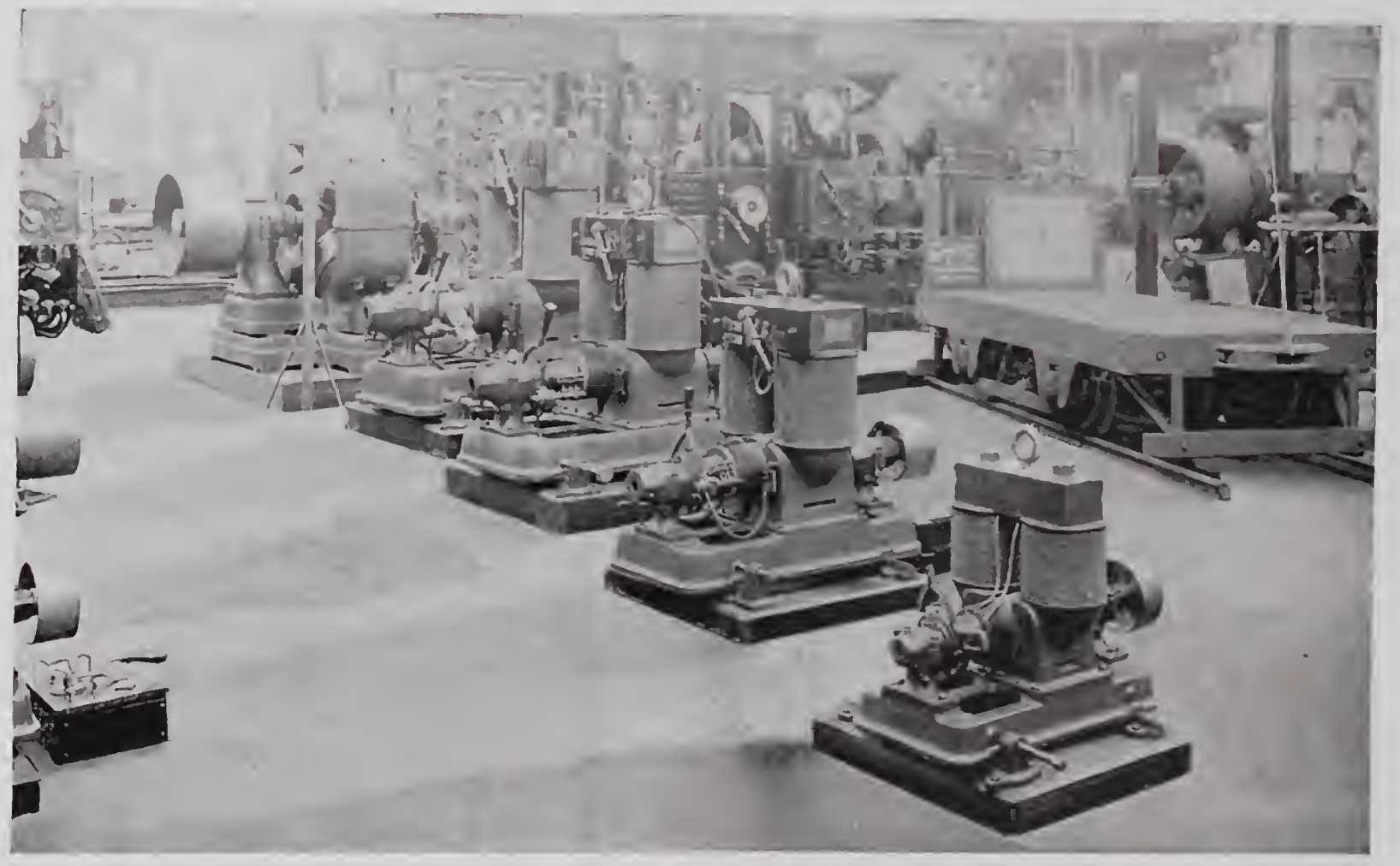
In its eastern section the company displays its Thomson-Houston arc-lighting apparatus in a larger oaken pavilion, containing also carbons of various grades arrayed in geometric figures, with dynamos and other appliances. Elsewhere in this section are the experimental apparatus used by Elihu Thomson for high voltage discharge, with portions of trees that have been struck by lightning showing the path of the bolt.

Among the objects of the department of Electricity was to illustrate the possibilities of that science as applied to mining and milling ores, not only in the transmission of power but in its direct application to purposes for which it could be made available. All this is demonstrated in the company's exhibit of machinery and appliances, including engines for hauling rock, mining pumps, hoists, drills, dumps, pressure



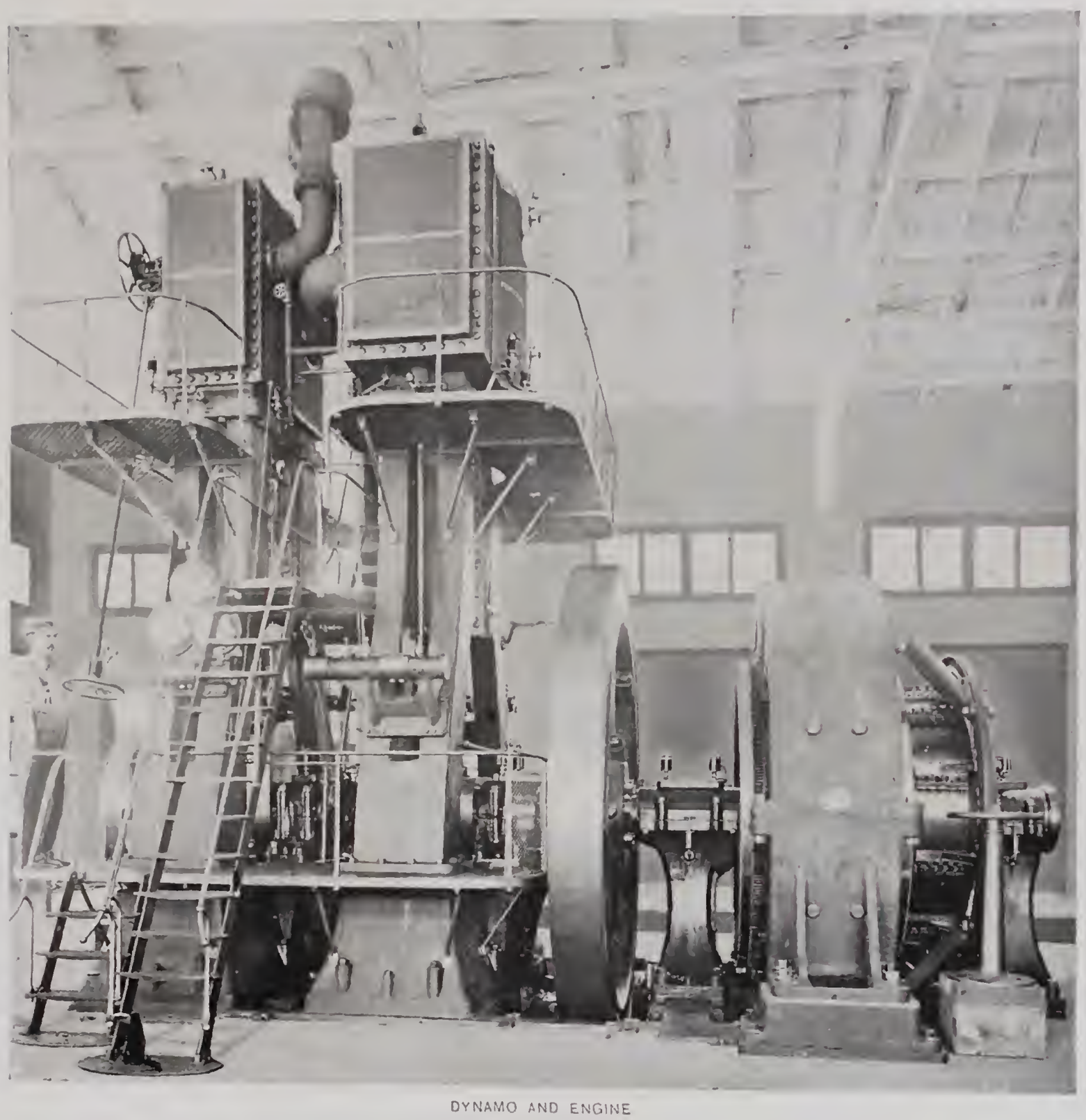
ELECTRIC MOTOR AND PUMP

blowers, air compressors, and centrifugal fans, with blocks of stone to show the working of the drills, and a large water tank to display the operations of the pumps. Thus is scientific mining being gradually revolutionized through the use of electric apparatus, which is also largely availed of for the working and refining of metals. Such machinery is rapidly gaining in favor throughout the mineral regions of the continent, from the coal mines of Pennsylvania to the gold and silver mines of Colorado, California, and Mexico. In addition to its more economic and expeditious work, electric appliances can be used to advantage at all seasons of the year, for the current in the wires is never checked by frost, and suffers no loss from condensation.



A GROUP OF MOTORS

Southwest of the Edison tower is the company's office, and adjacent to this its display of electric motors for railway purposes, for power transmission, and for general application, with a specimen of such as are used in the electric launches which ply on the waterways of the lake. There are also derricks, hoists, and a large collection of railway apparatus, with photographs displaying among other objects of interest the first electric railway built, as I have said, in 1885. Elsewhere in the company's collection are magnets, induction coils, converters, and transformers; instruments of precision, voltmeters, ammeters, and Watt meters; dynamos with direct and alternating currents, and for duplex telegraphic service, and apparatus used for war vessels, and for electrical construction and repair.

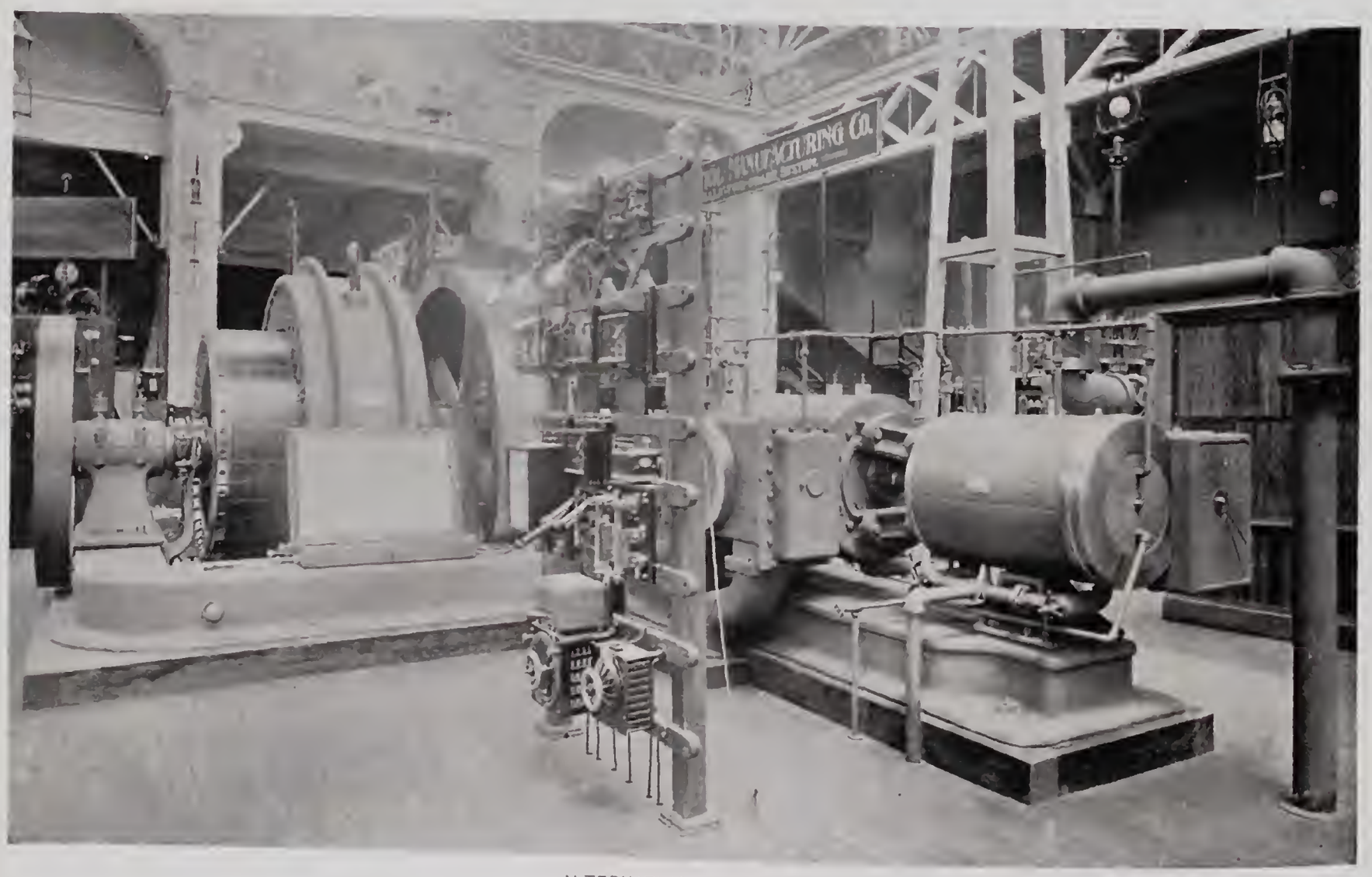


DYNAMO AND ENGINE

Upon the tracks west of the terminal station the company has on exhibition what is claimed to be the most powerful electric locomotive in the world. It weighs thirty tons, is more than sixteen feet long and eleven in height, and has two motors, one at each axle, supplying the power. The locomotive is substantially constructed, its cab being of sheet iron with a fine interior finish of hard wood. Although the engine has been especially devised for railway work, it is proposed to introduce it upon suburban and elevated roads, and upon switching and short freight lines. An electrical air compressor furnishes power for brakes and whistles.

In truth there are few exhibitors more fully represented in the various branches of the Fair. By this company was furnished the equipment for the elevated intramural railroad, with power sufficient to keep in motion on its road-bed eighteen trains at a time, and with accommodation for several thousand passengers. The electric launches on the lagoons are propelled, as I have said, by its motors, the power being furnished by storage batteries beneath the deck. The huge iron girders and trusses in the Manufactures and other buildings, the monster locomotives in Transportation hall, and the heavier groups of statuary were all placed in position by its motors, which are also largely used for supplying machinery with motive force. Finally the electric fountains and two of the search-lights used for illuminating purposes came from the company's workshops.

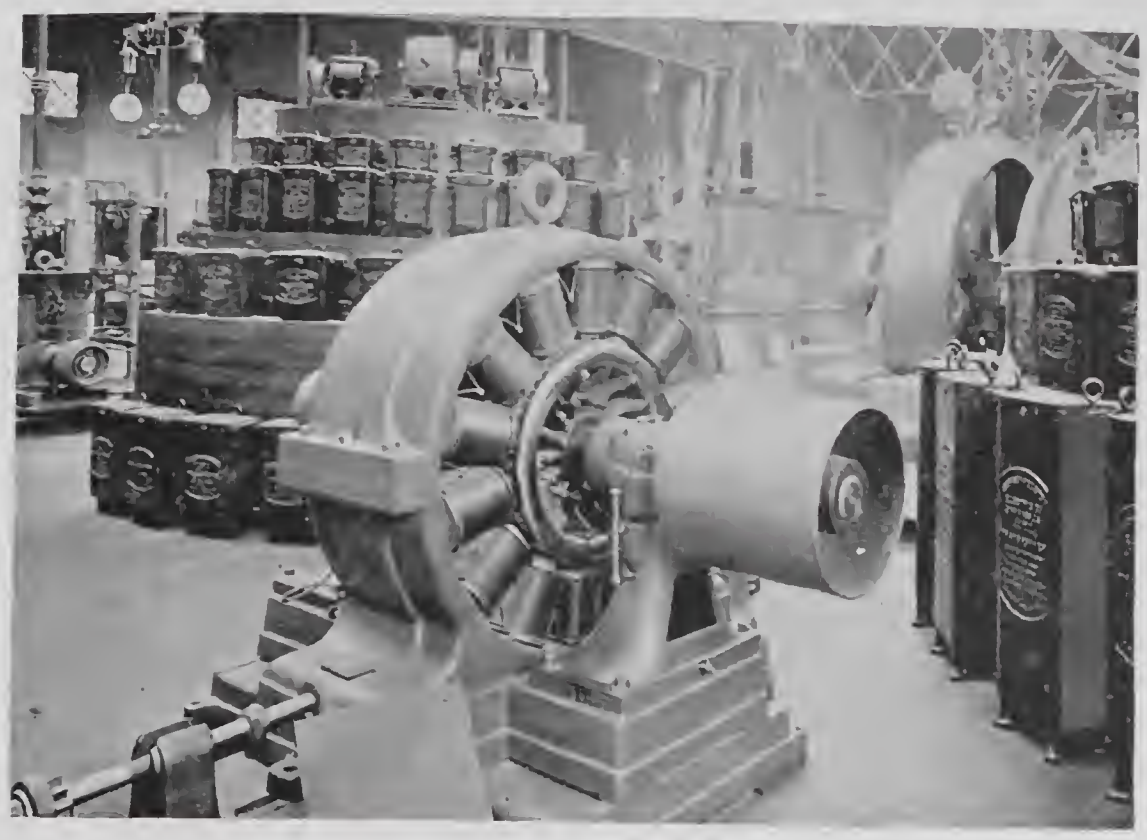
Adjacent to the exhibits of the General Electric company are those of the Westinghouse Electric and Manufacturing company, by which was installed in Machinery hall the great power plant used for lighting the Exposition and buildings, capable of supplying simultaneously nearly 200,000 lamps with a total capacity of more than 3,000,000 candle-power. In the collection of appliances for arc and incandescent lighting, prominence is given to its alternating current lighting apparatus; but here and elsewhere are fully illustrated all the more recent improvements in the various branches of applied electricity. An interesting feature in its display is



ALTERNATING DYNAMOS

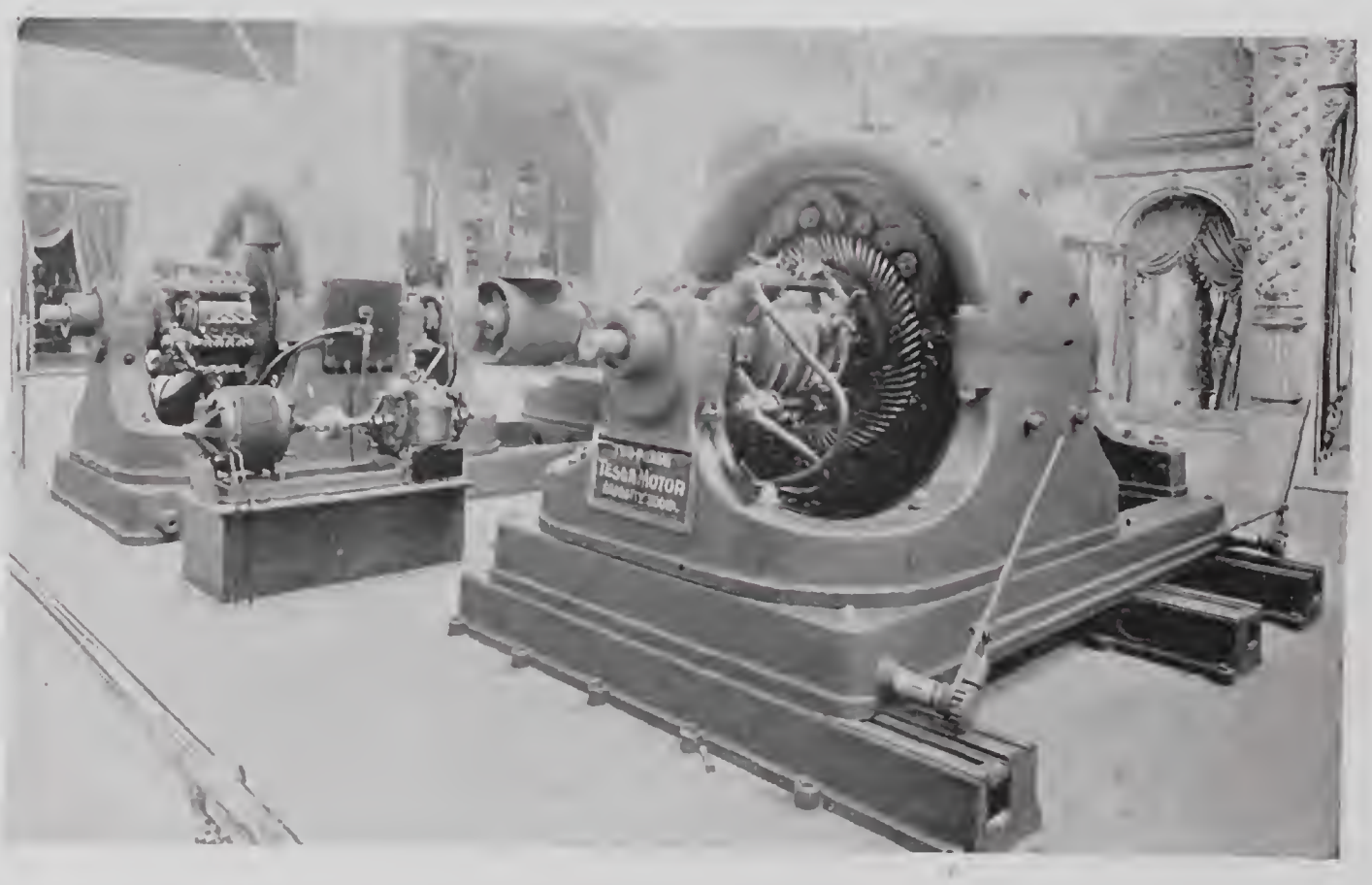
a profile of Columbus, with decorative scrolls and letters, traced in incandescent lamps against a background of terra cotta on the southern wall of the Electricity building.

Elsewhere in its 15,000 feet of floor space, and north of the Edison tower, is a darkened room for the display of what are termed high potential and high frequency phenomena. Adjacent to this we enter, through an archway richly colored in cream and gold, a section containing several of the first motors fashioned by the Austrian inventor, Nikola Tesla, with apparatus showing the results obtained in the use of high frequency alternating currents. Here also is fully illustrated the Tesla polyphase alternating current system for the transmission of power, including a 500 horse-power generator, the switch board at the generating station being connected with the one at the receiving or distributing station by an overhead four-wire circuit. The insulators that support this circuit are of the pattern designed for the San Antonio Light and Power company of Pomona, California, by which power up to 10,000 volts can be transmitted for 28 miles by an overhead circuit of bare copper wire.

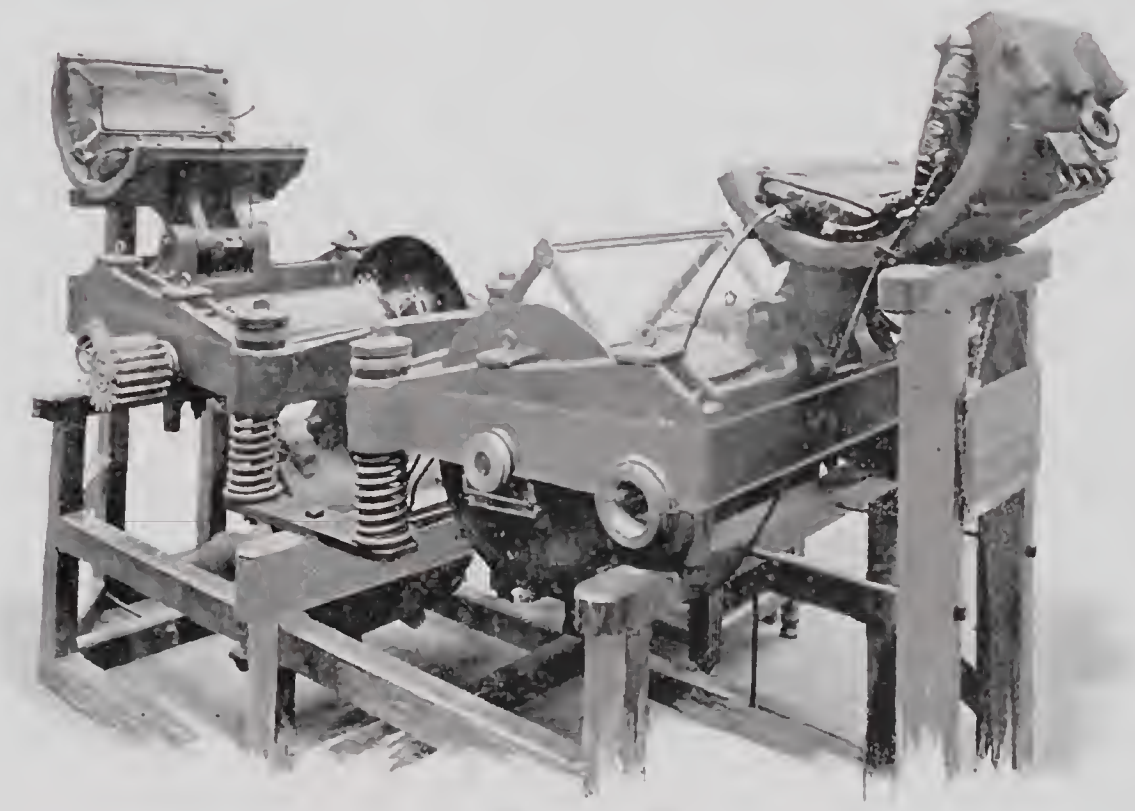


A MAMMOTH DYNAMO

In its southern section the company has a collection of street railroad apparatus, with two powerful multipolar generators, one driven by a compound engine, and the other by a belt, with cars equipped with motors of the single reduction type, beneath which are galleries permitting visitors to examine their interior mechanism. There are also lines of switches, ammeters, voltmeters, and circuit breakers, with minor exhibits pertaining to the construction and working of such electric railway systems as those in which the company's cars carry their thousands daily between Chicago and its Fair.



A large area in the southeastern portion of the hall is occupied by the Western Electric company, of Chicago, whose exhibits consist of the apparatus which it manufactures, and the various spectacular effects produced thereby. The column which flashes forth zigzag lightning, around it revolving balls of fire, is one of the ornamental gems of the Exposition, and divides attention with the Egyptian temple whose exterior walls are decorated with native figures engaged in the manufacture and operation of the telephone, fire alarm, electric apparatus, and other of the company's devices. Egyptians are manipulating cables, dipping reels of wire into insulating baths, and bearing to their queen, typical of Chicago, lamps, dynamos, motors, batteries, and other appliances.

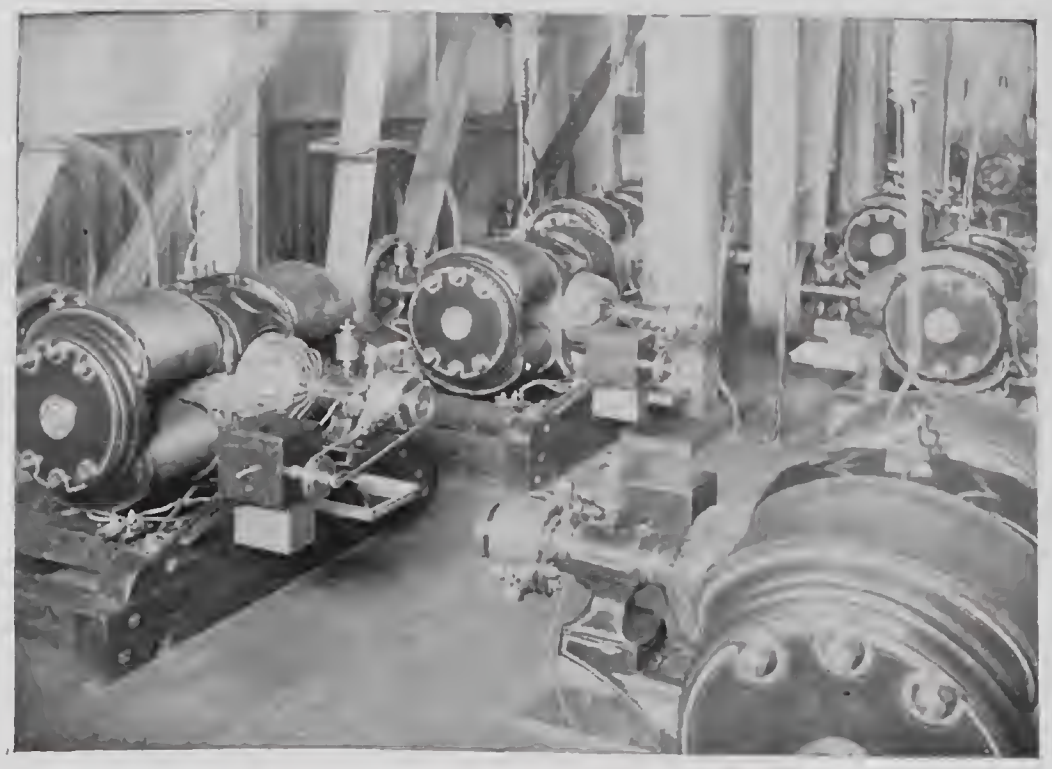


STREET CAR MOTOR WESTINGHOUSE COMPANY

The temple is colored in warm roseate hues, with frieze of old gold and stencilling in Egyptian designs, while lotus blossoms and cut-glass jewels, lighted by hidden incandescent lamps, form the most striking decorations of the main entrances. The interior is divided into two compartments, whose rich ceilings and columns of glass are illumined by more than 1,000 changing lights, their decorative scheme including the lotus, the eagle, and the hooded serpent. Around the walls are show-cases, lined with red plush, and containing apparatus of the company's manufacture, as switchboards, receiving instruments, recorders, galvanometers, a stenographic machine for



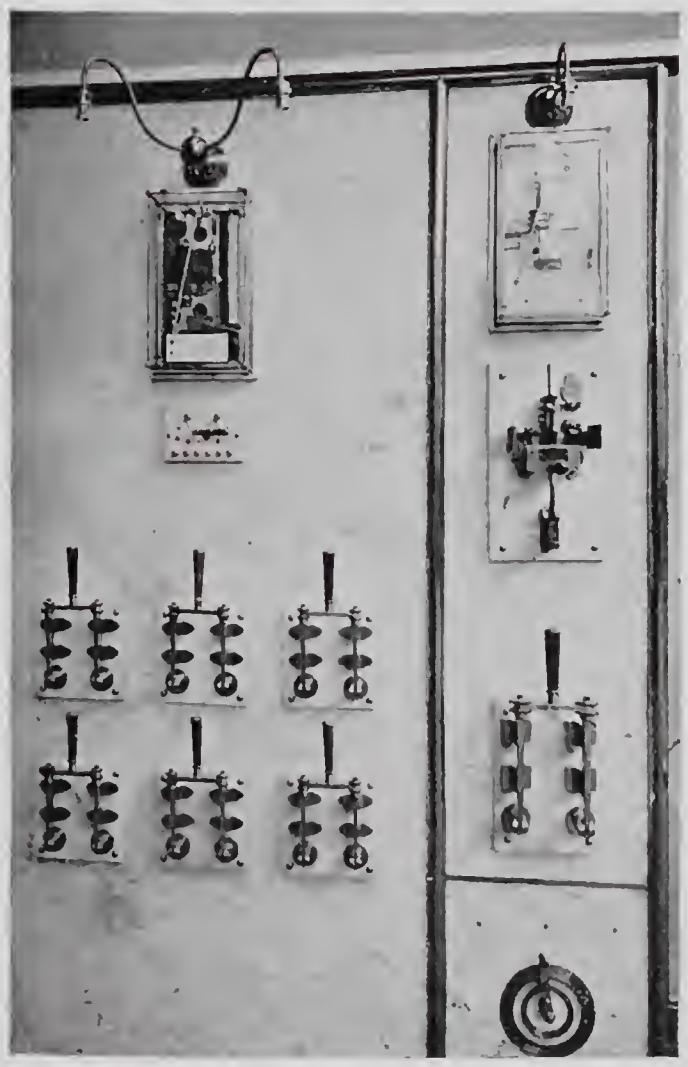
ELECTRICITY BUILDING NORTH FRONT



DYNAMOS OF WESTERN ELECTRIC COMPANY

company's plant at Machinery hall, half a mile away. Near the switchboard are various machines used by the company in manufacturing processes, including those which make nuts and screws, which insulate wires with silk and paper, braid the strands of conductors, and wind them upon spools, and perform a score of operations formerly done by hand. A complete exhibit of telephone apparatus is a feature of the display, including machines made by its factories in New York, Chicago, and Antwerp, and those constructed for the American Bell Telephone company. There is a large array of switchboards, showing the different styles fashioned within the past decade, with reels of cable covered with lead, and insulated with paper instead of cotton and paraffine.

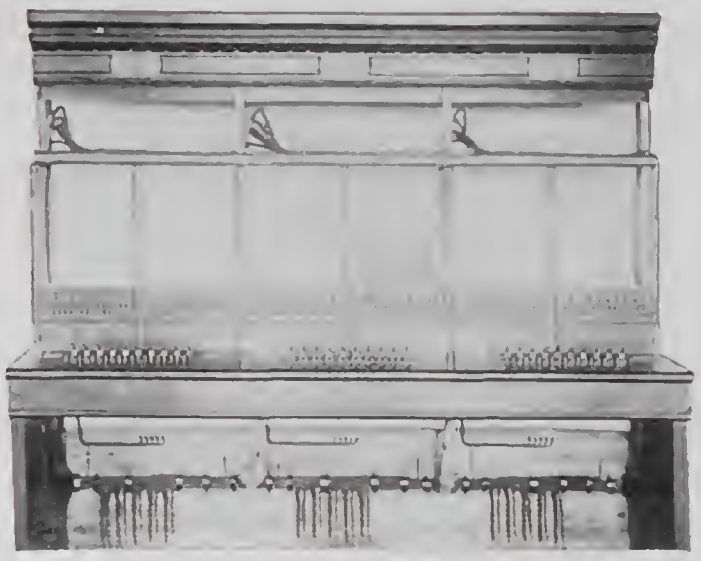
In this section is the tabulating machine used in United States census work, and an ingenious mechanism whose long finger terminating in an incandescent bulb, is continually writing in air the words, Western Electric company. Batteries and incandescent lamps are elsewhere grouped, and a portion of the space is occupied by a small scenic theatre presenting an alpine landscape, over which are cast the changing hues of night, dawn, midday, and sunset, thus showing that with skilful manipulation electric light may be shorn of its coldness and hardness, and endowed with all the rich colors of the natural rays. In a historic collection is a large portrait of Moses G. Farmer, and a handbill dated 1847, advertising the public exhibition of his recently invented electro-magnetic engine. The Farmer electric cars and incandescent lamps are still among the specialties manufactured by the company.



WESTINGHOUSE SWITCHES

the use of the blind, a printing machine for telegraph operators, district telegraph and police call boxes, electric bells and buttons for hotels, elevators, and residences, in short, a collection covering almost the entire range of electric supplies.

But the Egyptian temple and the electric tower by no means complete the company's display. Close at hand is a switchboard composed of slabs of Tennessee marble mounted in bronzed copper, from which issue the currents which supply both these structures, its reverse side showing the various connections, and the entrance and distribution of the circuits which originate in the



TELEPHONE SWITCHBOARD



IN THE WESTINGHOUSE EXHIBIT

Adjoining the exhibits of the Western Electric company is a classic structure, with two large porticos, representing the American Bell Telephone company. At its main entrance is a broad stairway, guarded by two figures of the sphinx, over which are large candelabra of bronze, and a row of Ionic pillars opening into a court containing fountains of tasteful design. Beyond is the temple proper, octagonal in shape, through which one may pass to the opposite entrance, or examine the collections in either of the side corridors.

On one of the walls are tabulated statements showing the growth of the company's business from 1881 to 1893, and from which it appears that in the former year it employed 1,400 persons, and in the latter nearly 10,000; that at the present time it operates more than 440,000 miles of wire in and between the larger cities, and that 552,000 of its telephones are in constant use. The map on which is represented its system of long-distance telephones indicates that Boston, Washington, and Milwaukee are at its extremities with lines between all connecting points of importance.



THE EDISON ELECTRIC TOWER

Telephones for the use of marine divers and those who travel by water are also on exposition.

In a series of cases covering the entire length of one of the corridors is a historic collection, representing the essential features of the telephone first constructed by Alexander Graham Bell in January, 1875, with subsequent improvements; also the Blake transmitter, the Hughes microphone of 1878, and other inventions bearing upon his patents. In the opposite corridor is a central telephone office, with a dozen or more of operators, where one may observe all the workings of what to most of us has long since ceased to be a mystery. Here is also a series of drawings and photographs, showing the underground construction of telephone systems now generally adopted in the larger cities. Within the inner chamber of the pavilion is a life-size painting of Bell, and a gallery of photographs showing the buildings owned or occupied by company. In the north portico beyond is a long-distance telephone connecting with New York, its workings daily exhibited and tested.

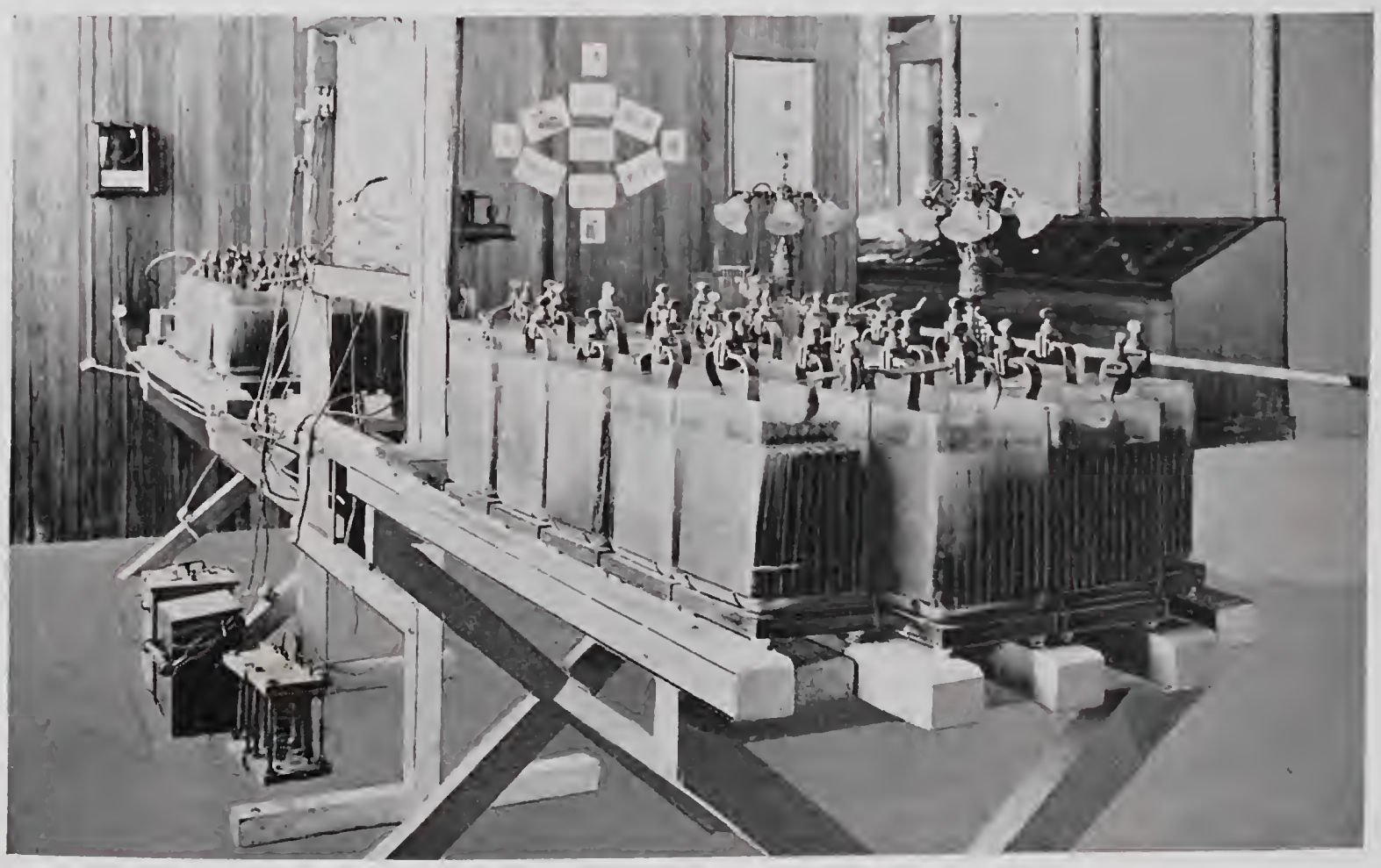
West of the space allotted to the Telephone company is a pavilion of Grecian architecture, whose ceiling is colored in imitation of the mid-day sky. Without is a collection of magnets, coils, and dynamos, among the last being a generator such as is used in the Calumet Hecla copper mines. A space of 30 feet along the western side is occupied by the largest switch-board in Electricity hall, specially constructed for exposition, 30 feet in height, and with a capacity of ten circuits and 30,000 lights. The company has also an exhibit of switch-boards for arc and incandescent lights, with electric motors of many kinds, and a large assortment of carbons.

The Fort Wayne Electric company, whose specialty is the manufacture of appliances used in the Wood system, has a large section of this vicinity in which are exhibited dynamos, magnets, generators, switches, motors, meters, and arc, incandescent, and search lights. Here also is displayed the first dynamo built by James J. Wood, in May, 1879, weighing only eighty-six pounds, together with the various lights used in several cities of metropolitan rank in which the Wood system has been largely adopted.



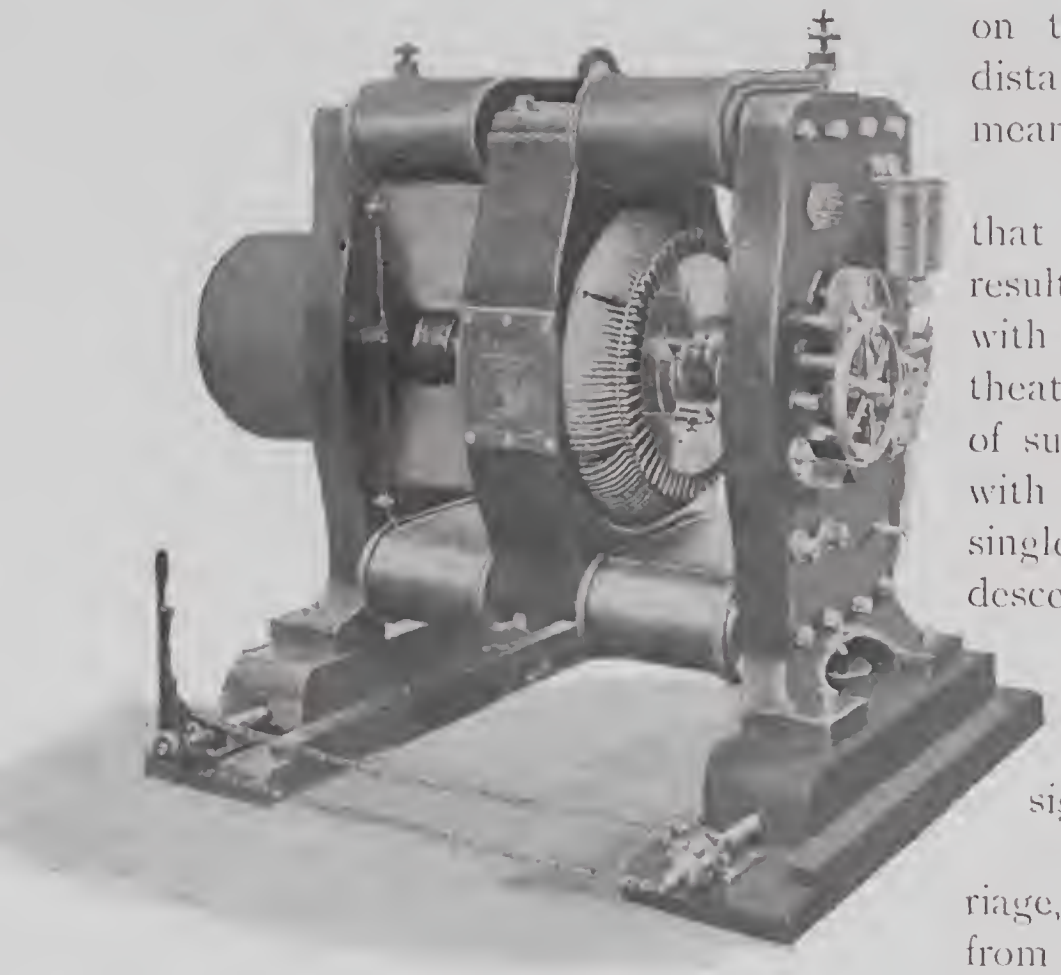
ENTRANCE TO BELL TELEPHONE PAVILION

In the groups above mentioned are represented the more prominent manufacturers of electric apparatus and supplies, their collections occupying the southern half of the Electricity building, and a portion of its northern section. But there are also numerous exhibits of a special, and some of them of a specially interesting character extending in unbroken array along the walls. Before describing them, in conjunction with the gallery display, let us first see what foreign countries have to show on the ground floor of the hall.



ELECTRIC BATTERIES

Among the German exhibits, occupying a liberal space in the northeastern portion of the building, may first be mentioned those of the Allgemeine Elektricitätz-Gesellschaft, or General Electrical society, whose headquarters are in Berlin, but with numerous branches elsewhere in Germany and other European countries. In the centre of its space are machines for the combined transmission of power by continuous and multiphase currents, the former being supplied by a large electro-motor, furnishing 100 horse-power and making about 500 revolutions to the minute. By means of such currents power has been transmitted from Lauffen on the Neckar to Frankfort-

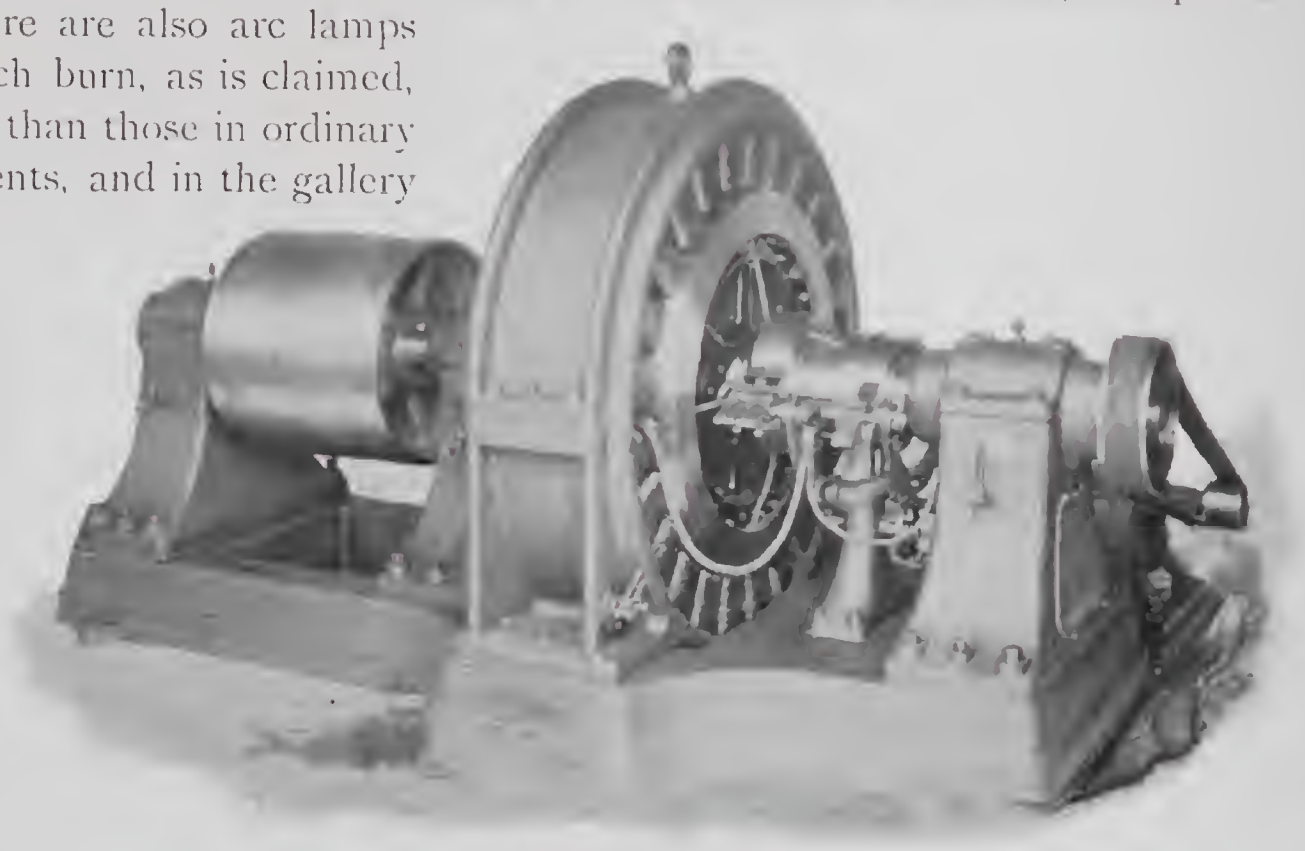


WOOD ARC DYNAMO

on the Main, more than 100 miles apart, this being the longest distance to which electric power has been transmitted, though by no means the limit of distance.

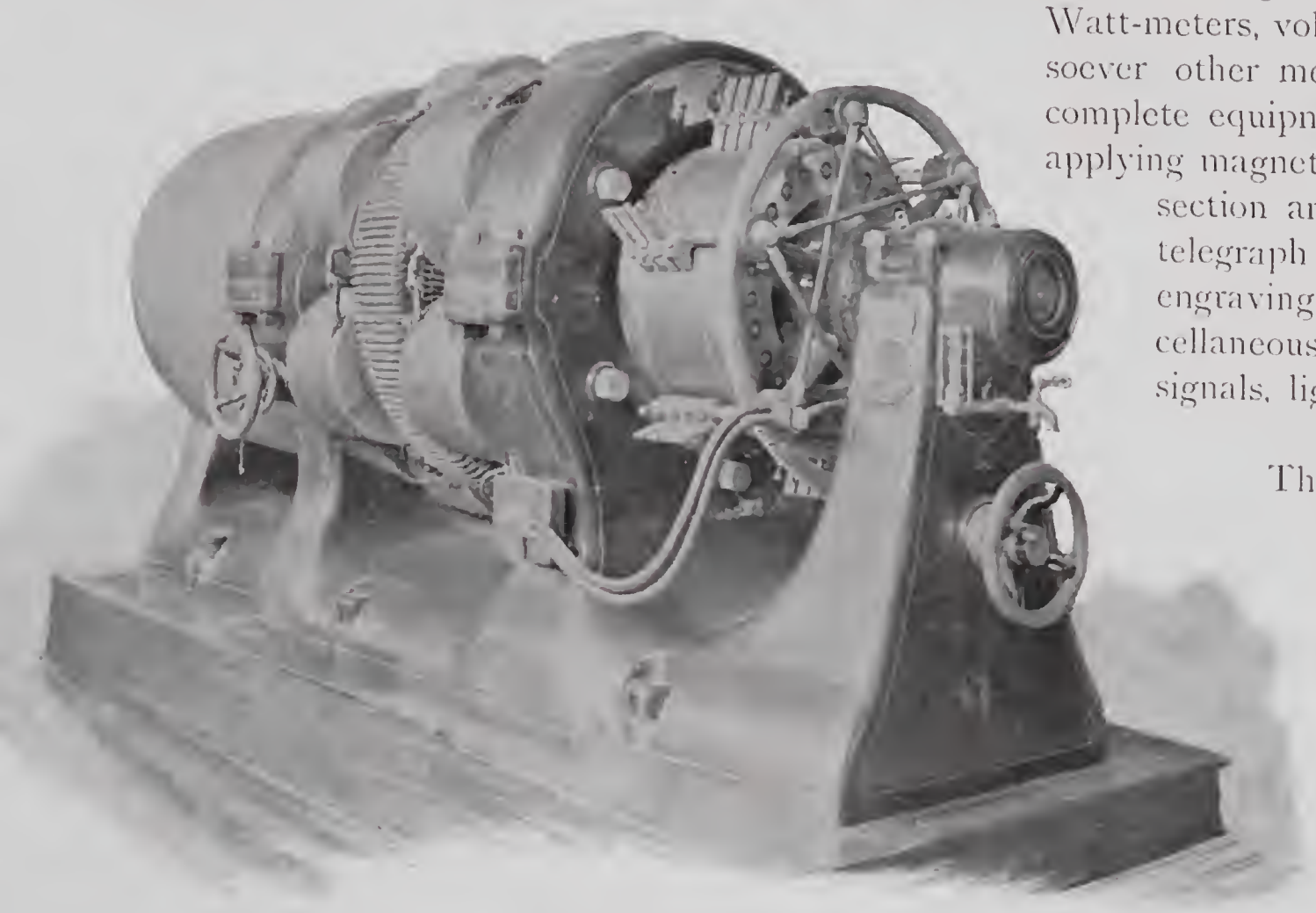
An interesting display is the stage-lighting apparatus, so arranged that its action may be observed from any point of view. This is the result of many years of study and practical experience in collaboration with specialists, and is now being largely used in German and other theatres. By it are produced the broad glare of noonday, the glow of sunset, the silvery shades of moonlight, and the grey hues of dawn, with lightning flashes and other intermittent phenomena, all by a single instrument connected with colored lamps. Of arc and incandescent lamps there is also a number of specimens, with motors and materials for electric railways, apparatus for storage batteries, conductors, conducting and insulating materials in many varieties, measuring and controlling instruments, electric clocks, railroad signals, and appliances for heating and cooking.

By Siemens and Halske of Berlin is exhibited a railway carriage, driven by a three phase current motor, the current transmitted from a distance, and reduced by a transformer to the strength required. There are also arc lamps which burn, as is claimed, without flickering, with a clearer, steadier light than those in ordinary use; there are surveying and measuring instruments, and in the gallery is a collection of historic apparatus of which mention is made elsewhere in this chapter.



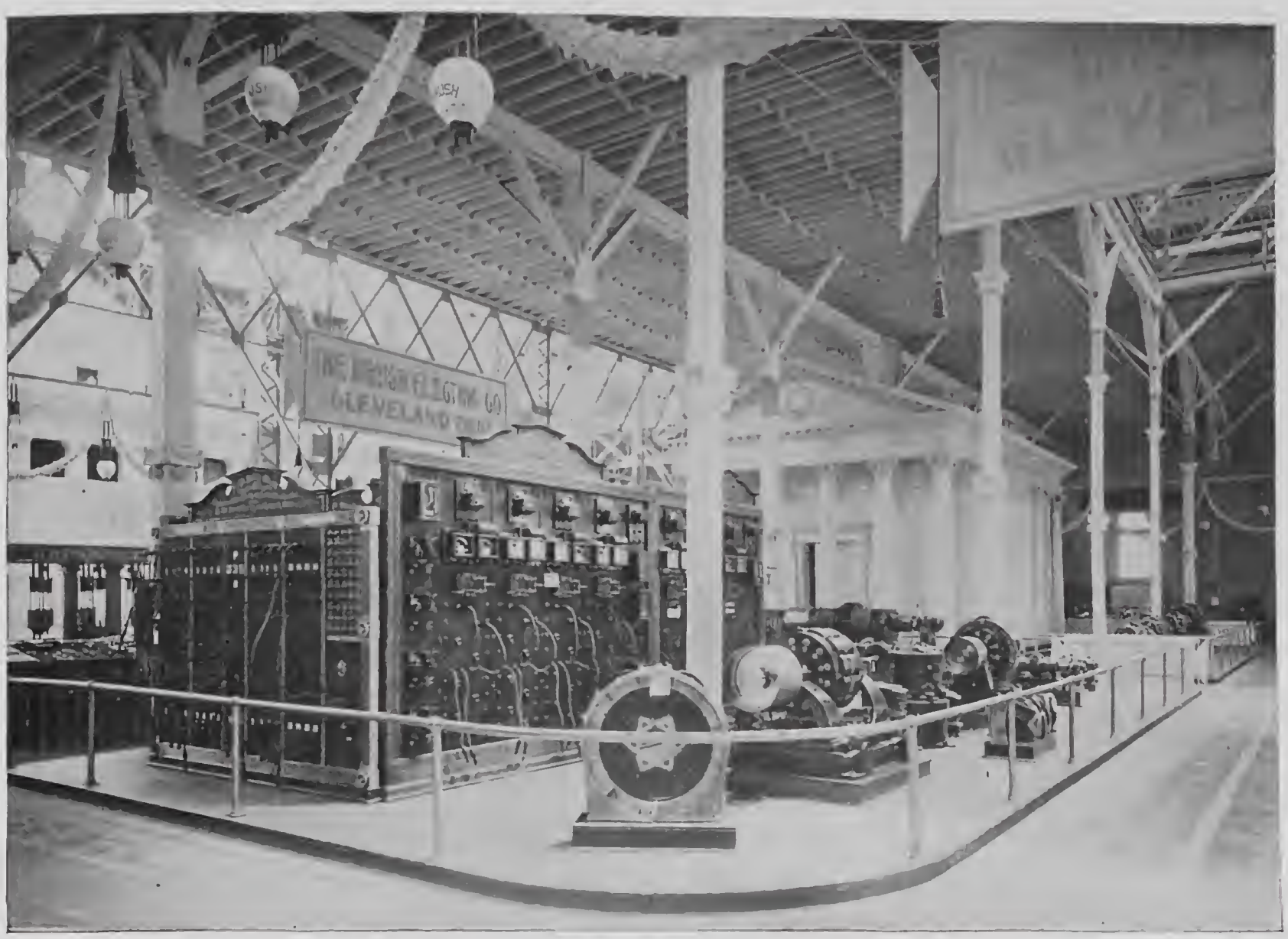
THE NEW WOOD DYNAMO

Among the exhibits by the Nuremberg firm of Schuckert and company the most remarkable are the great searchlights on the roof of the Manufactures and other buildings, as described on a former page. Felten and Guilleaume of Carlswerk have a large assortment of wires and cables in coils and cross sections, many of them arranged in the form of pyramids, with barbed, braided, and other wires of many varieties and in many forms. Hartmann and Brown have numerous specimens of apparatus, manufactured at their works near Frankfort on the Main, where are produced surveying and measuring instruments, galvanometers, magnetometers, Watt-meters, volt-meters, ammeters, pyrometers, and whatsoever other meters are known to electrical science, with complete equipments for laboratories, and mechanisms for applying magnetic tests to iron. Elsewhere in the German section are machines and lamps for electric lighting, telegraph and telephone instruments and appliances, engraving and electro-plating apparatus, and miscellaneous exhibits, as of burglar and fire-alarm signals, lightning rods, and electric toys.



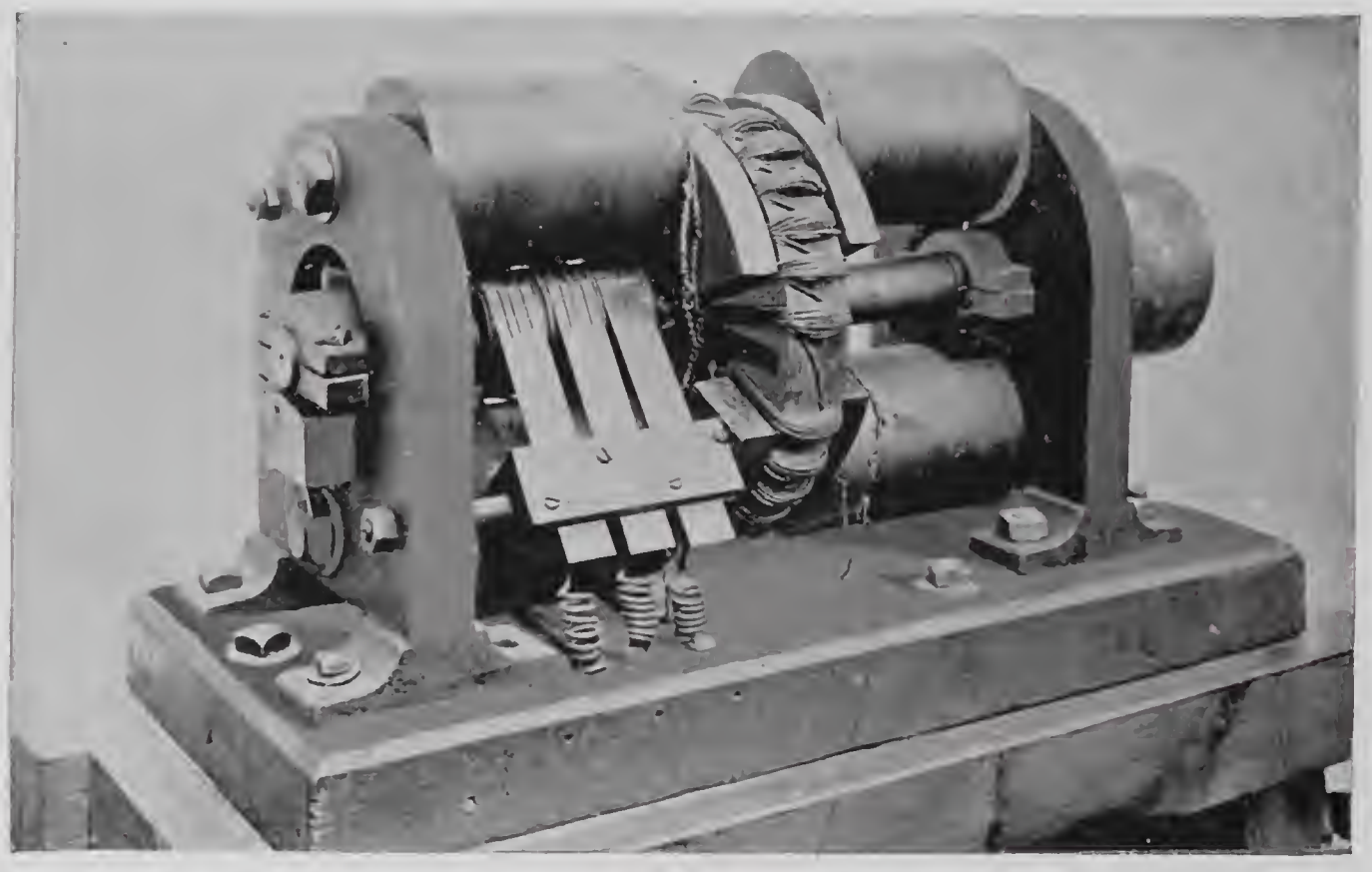
DISPLAYED BY THE SHORT COMPANY

The French section adjoining on the north the exhibits of the General Electric company, contains both national and private collections, the former chiefly in the northwestern corner of the main floor. Here are explained the telegraph and telephone systems organized and operated under government control, and there are self-acting instruments registering changes in temperature, atmospheric moisture, and direction of wind. In one of the cases are machines for testing cables, their speed. The multiplex telegraphic system of E. Mercadier, director of the polytechnic school, is illustrated by a collection of apparatus. By means for ascertaining the resistance of electric currents, and for measuring



of rapid alternate currents it is possible to use the same wires with multiplex and simple instruments, the former transmitting twelve telegrams in one direction, or transmitting and receiving the same number simultaneously. Mercadier and others have several multiplex printing machines, and there are automatic transmitters, a sextuple telegraph, and a model Morse station of four lines. A curious instrument called the Caselli autographic telegraph, patented in 1864, has for its object, as yet only partially realized, the fac-simile transmission of writing.

On the walls of this section are maps showing the routes of telegraph and telephone lines, and diagrams illustrating the development of the telegraphic system since 1851. As the exhibit is specially made by the department of posts and telegraphs, pictures are also shown of the quarters occupied by the government telegraph force. This consists of about 900 employés, the department representing a system which embraces 178,000 miles of wire, and despatches 40,000,000 a year of telegrams. To the telephonic systems there are more than 11,000 subscribers.



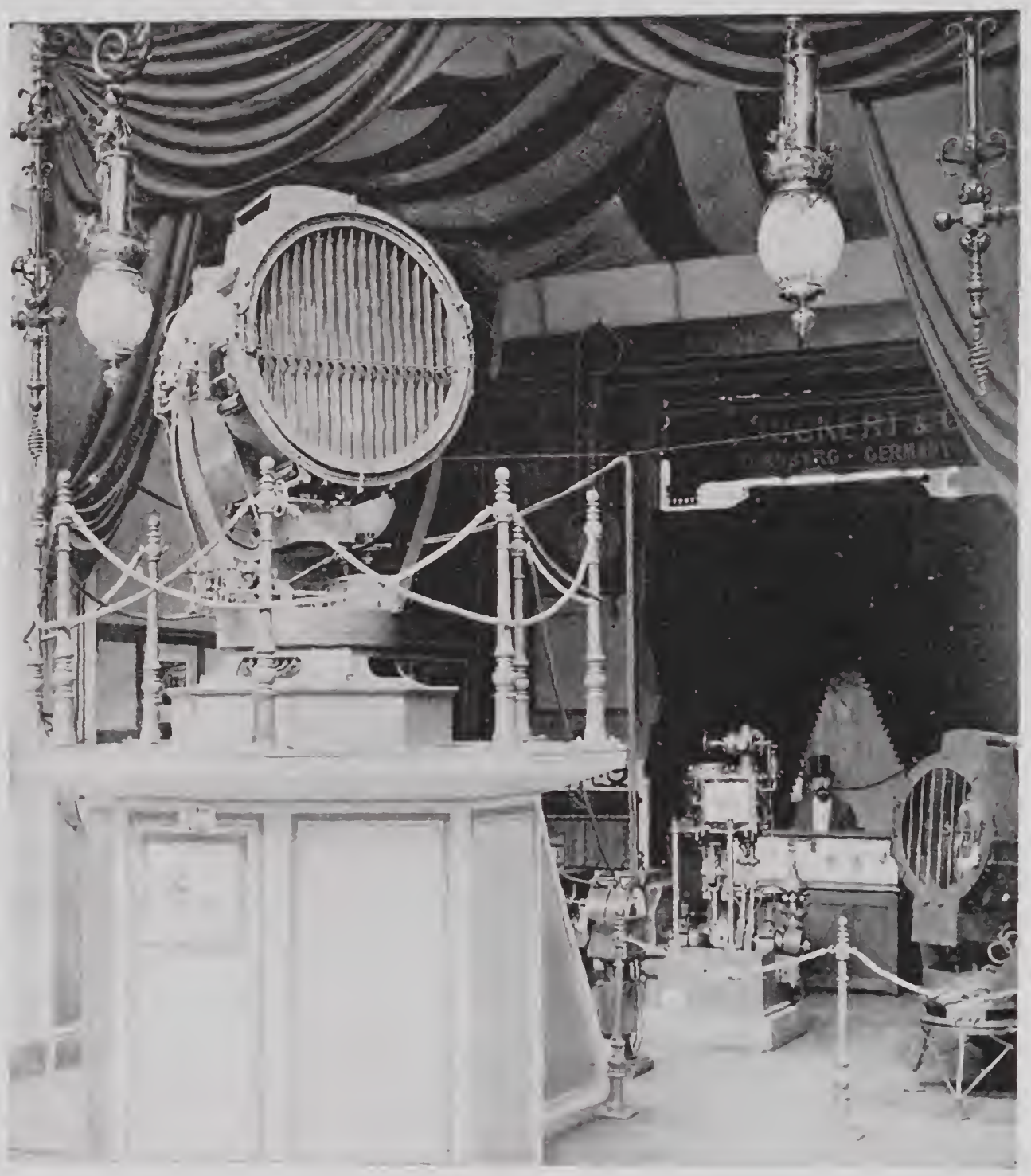
A BRUSH DYNAMO

Among the private exhibits are large collections of apparatus for lighting, power transmission, and miscellaneous purposes. A prominent feature is the appliances used for lighthouses, with the most powerful of reflectors and revolving beacon lamps, casting a blinding glare as seen at night in operation. Of special interest also is the electric cupola and furnace of M. Moissan, in which that young French scientist has developed a heat up to 9,000 degrees of Fahrenheit. By A. Piat and Sons of Paris and Soissons is displayed a hydro-electric riveter, driven by a combination of hydraulic pressure and electricity, and largely utilized for bridge work. For this and other riveting machines manufactured by the firm special advantages are claimed, some of them having been used by the department of public works, as for the erection of 1,000 feet spans over the river Loire. Elsewhere in the French section are exhibits similar to those of Germany and the United States, together with such scientific curiosities as electric matches, musical appliances, and apparatus for towing vessels, based on the principle of magnetic adherence.



NICKEL PLATING MACHINERY

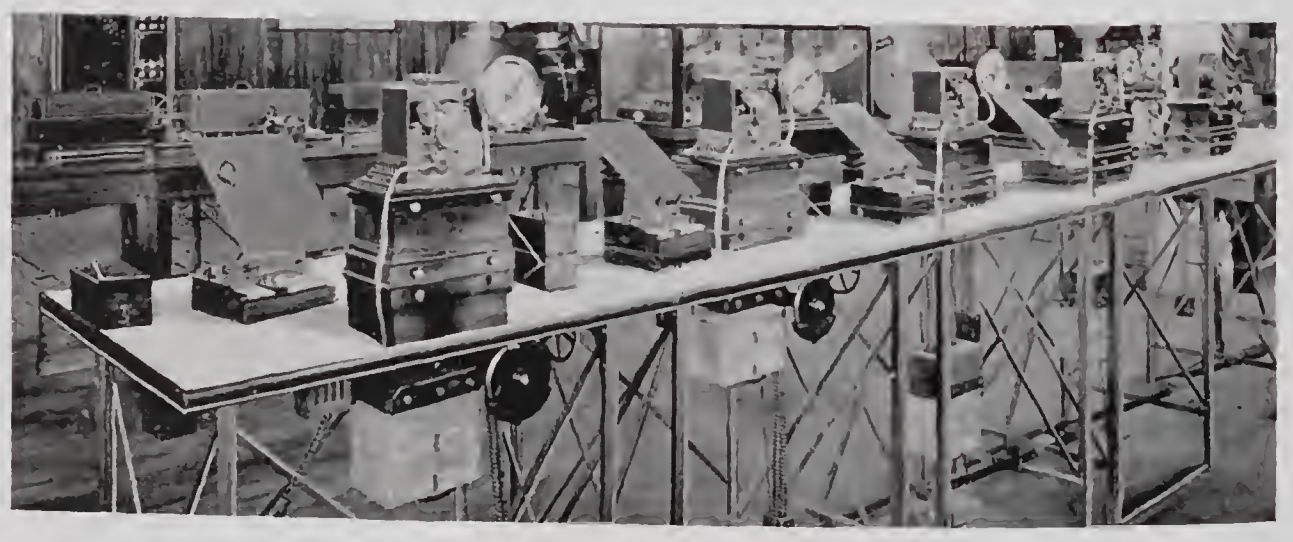
In the British section, west of the French exhibits, the most attractive feature is the collection of telegraphic apparatus contributed by the government, dating back to 1837, including the first specimen of underground telegraphs, and the earlier needle and other primitive instruments, all contrasting somewhat strangely with the modern appliances at their side. Add to these a few private exhibits, with those of the London branch of the General Electric company, and we have about all that Great Britain has to show us in this department. Among the former may be mentioned the display of the Homacoustic Speaking Tube company, consisting of attachments for voice tubes, and a homacoustic commutator with electric signalling device.



ONE OF SCHUCKERT'S SEARCH LIGHTS

Near the northwest corner of Electricity hall is a tasteful structure, the purpose of which, except for ornament, does not appear until approaching close to it we find here a tower-like fabric composed almost entirely of carbons, cored and solid, and varying from an eighth of an inch to three inches in diameter. This is the exhibit of the Vienna firm of Hardtmuth and company, one of the largest of European manufacturers, and by which have been overcome the more serious difficulties in supplying a carbon adapted to modern conditions. Though more expensive than those of American make, it is claimed that this is more than compensated by superior efficiency, and thus it is that from the agents of the firm large quantities were purchased for use on the incandescent circuits within the Exposition grounds, for the illumination of the central court and basin, the electric fountains, and the battle-ship *Illinois*.

In the northeastern portion of the hall, near an array of noisy phonographs, is a collection of silent and motionless instruments which have a deep meaning to the Japanese and all other peoples who live in dread of earthquakes. It represents the exhibit of the Earthquake laboratory of the imperial university of Japan, and the instruments, known as seismographs, were invented partly by natives and partly by Europeans, not only to record the direction and violence of shocks, but to foretell their approach by indicating the slightest tremor of the earth's surface. The first earthquake instrument ever constructed, a drawing of which is displayed on one of the walls, is claimed as a Japanese invention, and bears date A. D. 132. In the more perfect machines of the present day the main feature of their construction is that during seismic disturbances they work from stationary points, and for minor shocks at least the diagrams written on smoked glass and paper are considered by scientists to be true measurements of the earth's motions.

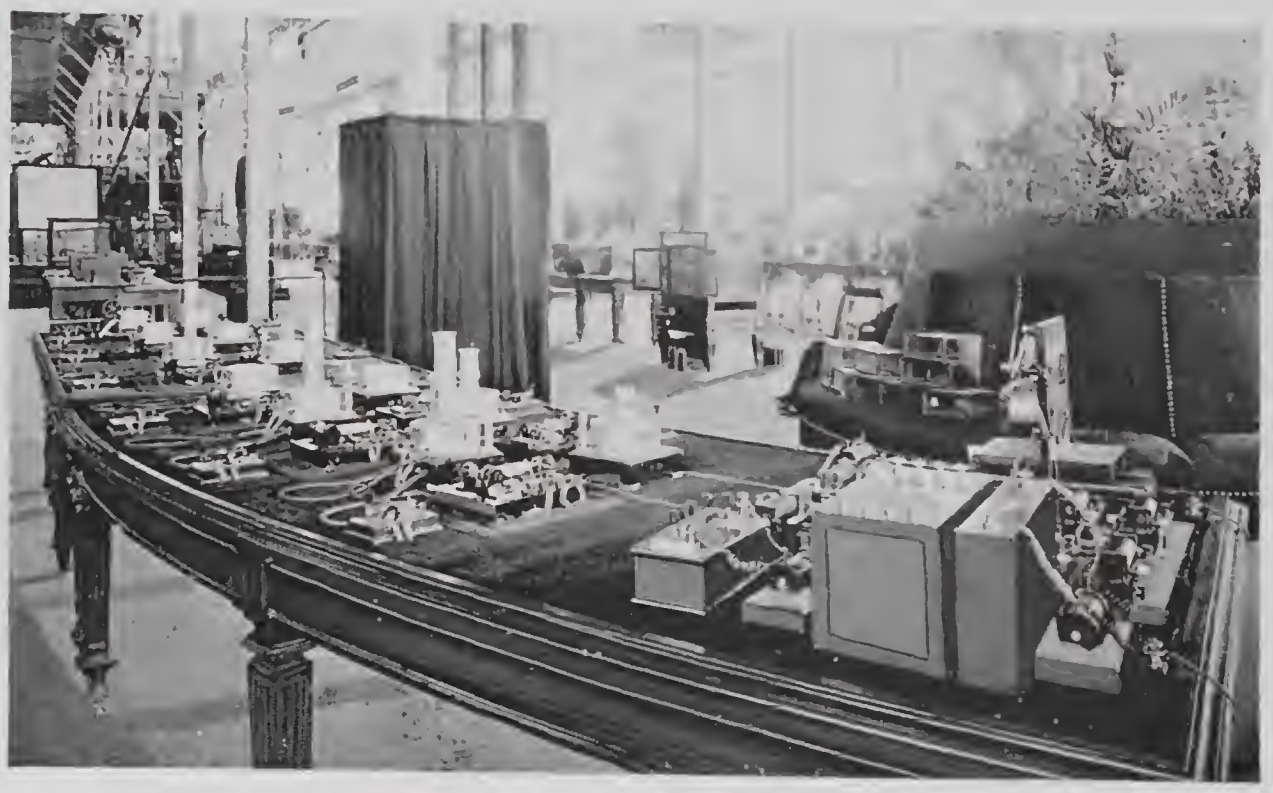


BOUDOT'S PRINTING MACHINE

Many instruments are here exhibited, of different patterns and intended for various purposes. Upon the slightest disturbance of the earth the electric circuit is closed, and the machinery set free which drives the recording surfaces on which the diagrams are written. In one style of instrument this consists of a smoked glass revolving plate, the lines being written upon it by horizontal pendulums and vertical spring levers, both motions of the earth being thus registered. But whether the record is made in this fashion or by pencils upon bands of paper wound on drums, the machinery is kept in motion by electric clock-work, the rate of revolution is marked by an electric time ticker, and when convulsion or tremor ceases the current is broken and the mechanism ceases to work.

Special instruments are used to record violent motions, wave-like undulations, and small, local displacements. A type of the last named is known as the mantel-piece seismograph, and is intended for the use of those who simply wish to know the direction and nature of motion as recorded at their own residences. The tromometer

is one form of an instrument used to record slight earth tremors, such as are common to many countries. Its essential feature is a delicate pointer from which electric sparks are discharged upon a band of paper, automatically moving across a brass table. If the pointer and the earth are at rest, then the holes which are burned are recorded in a straight line; otherwise, the bands of paper are perforated in all directions around what would be the normal line. A more satisfactory and recent method of registering these motions, is by means of a continuous photograph of a ray of light reflected from a small mirror attached to an extremely delicate horizontal pendulum. There are also in this group a clock for recording the duration of an earthquake, and several safety lamps which, if overturned, are at once extinguished. Under a glass case is a mass of wire, bent and twisted in all directions, representing the trend of the shocks during the great convulsion of January 15, 1887, the numbers at different points indicating the seconds of their duration.



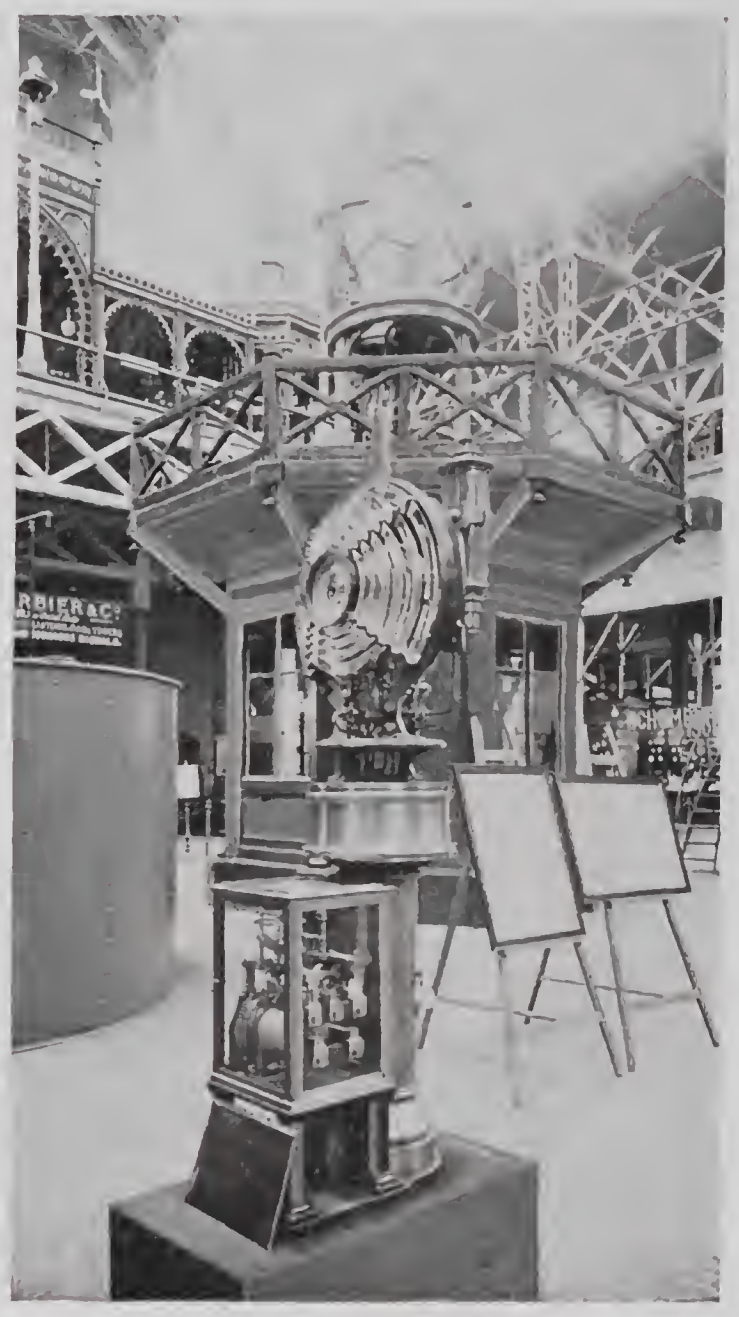
MERCADIER'S MULTIPLEX TELEGRAPH INSTRUMENTS

Near the collection of instruments from the seismological laboratory is a series of pictures representing ruined buildings, dark fissures in fields and valleys, bridges hurled into rivers, and other effects of such convulsions as those of 1887 and 1891. Here alone is a sufficient explanation of the interest taken by the Japanese in the study of seismic phenomena, whereby they hope eventually to obtain such scientific data as will enable engineers to build structures that will withstand the strongest shocks and the most complex motions of the earth.



FRENCH TELEPHONES

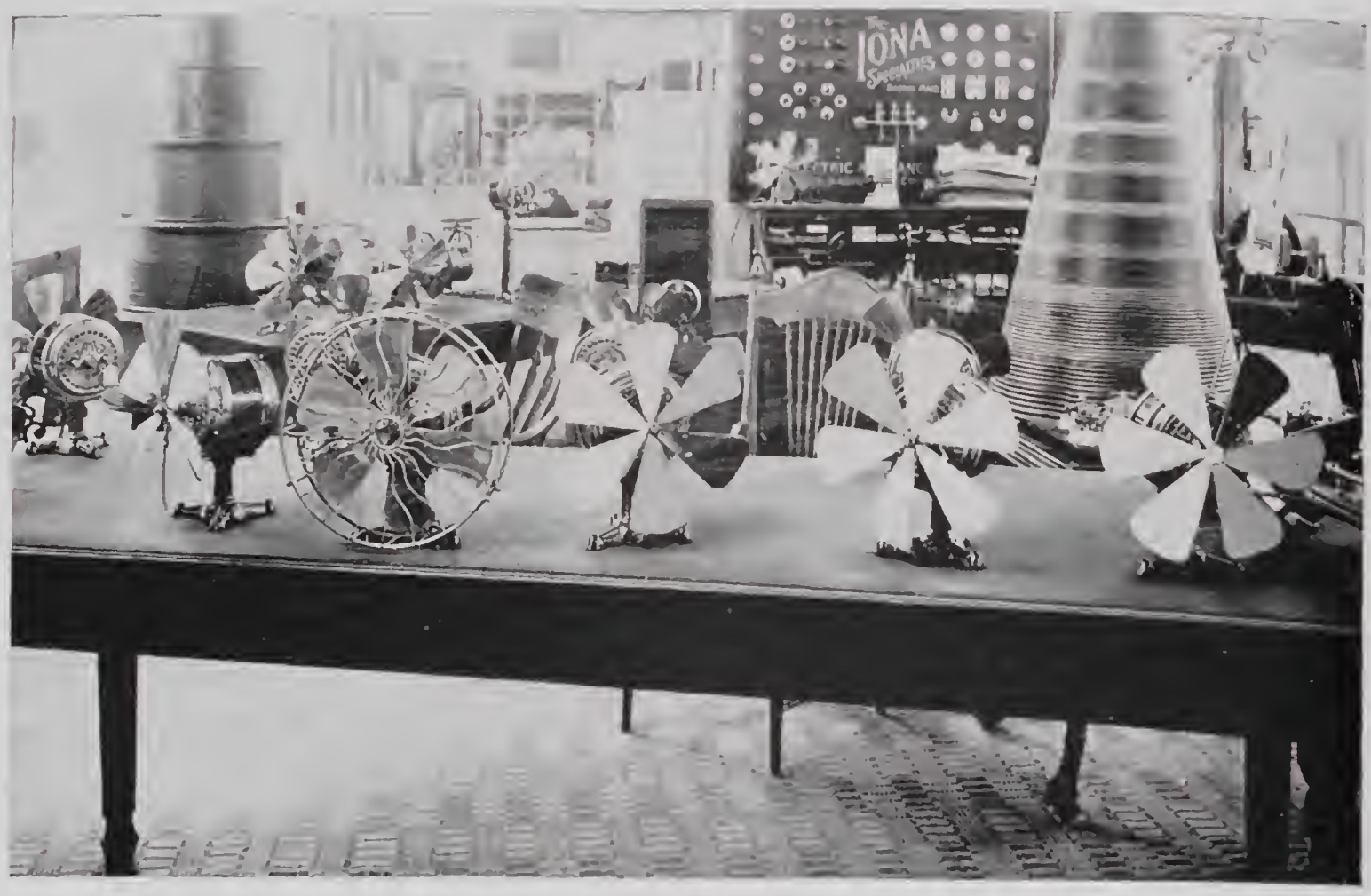
Electric motors, with their application to street, underground, and mining railways, and to machinery in general, are displayed in various portions of the hall and galleries, as well as in the Machinery and Transportation buildings. On the ground floor a factory at Portland, Maine, has among its collection a coffee mill which can be operated either by electrical or water power. By the former process it is claimed that coffee may be ground at a cost of five cents for every hundred pounds. Other of its exhibits are a combined water motor and dynamo, and a combined engine and dynamo, both of which are among the most powerful mechanisms of their kind.



LIGHT HOUSE REFLECTORS, FRENCH SECTION

On either side of the southern portal are exhibits of motors, the largest by an electric motor company of New York, which has also fans for ventilating ships and large buildings, with blowers for forges and furnaces, pumps for mining operations and water works, travelling cranes and hoists, organ bellows, elevators, mill machinery, and telephone and telegraph apparatus. Opposite is the dainty bronze pavilion of the Indianapolis company, another manufacturer of electric power machinery. Near the western entrance of the hall, the company which operates the movable side-walk at the lake pier has a large collection of generators, motors, dynamos, and appliances for incandescent and arc lighting. For its so-called Novak lamp, outlined on the pavilion in letters of light, it is claimed that this is the only incandescent lamp that retains to the last its original candle power.

The largest manufacturers of electrical machinery who exhibit in the body of the hall, make a specialty of supplying street, underground, and elevated railroads, with their operating apparatus. There are also several companies whose operations are restricted to these specialties, a Cleveland firm displaying one of the simplest of all such mechanisms, a single motor suspended on rubber cushions from the truck frame, so protected that it cannot be injured by heat or cold, dust or gravel, water, snow, or slush. Another company shows a gearless street-car motor, for which it is claimed that few of its appliances will either wear out or injure any of the surrounding parts.



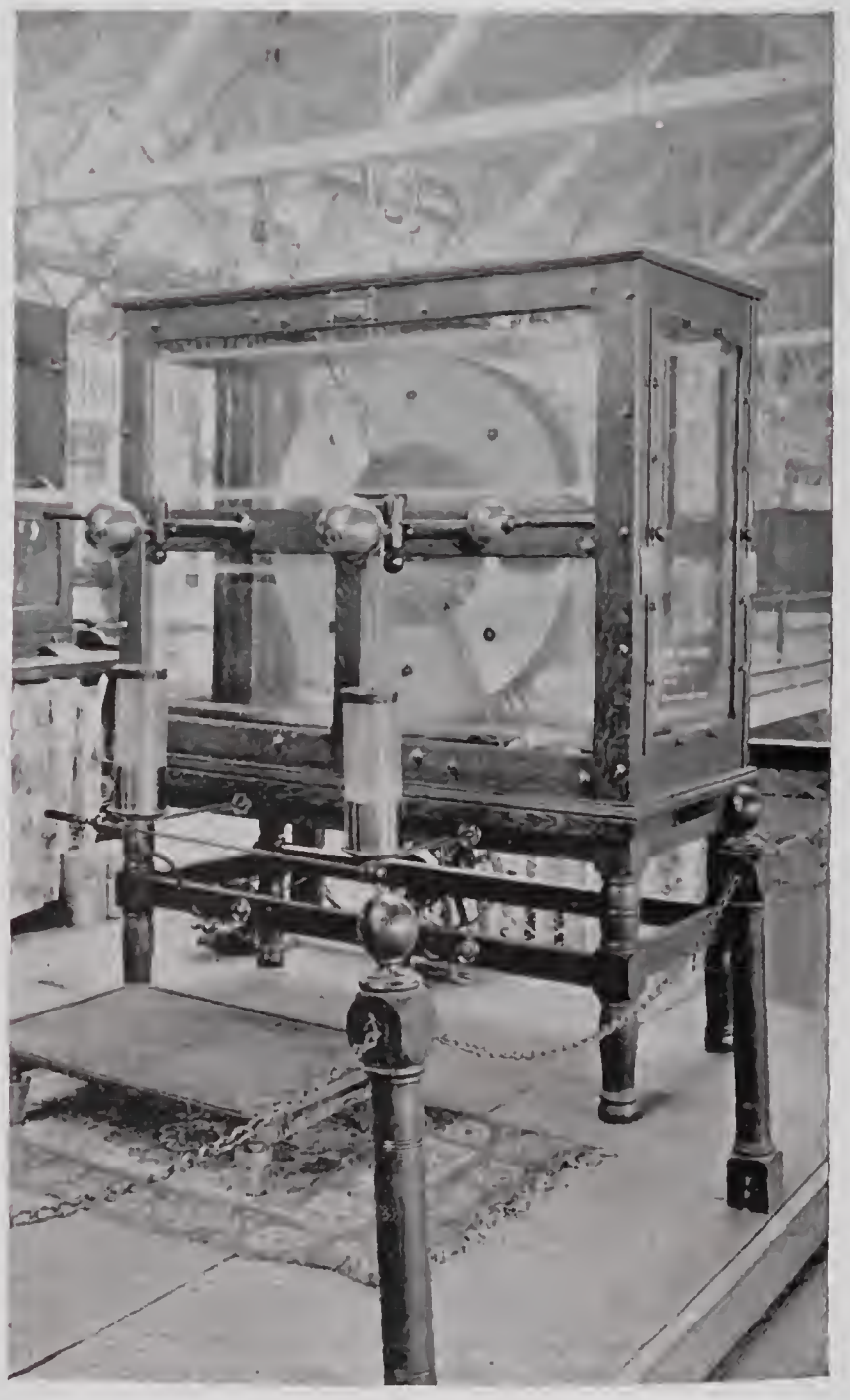
ELECTRIC FANS

Near these exhibits is a collection of machines made by an electric welding company, of Boston, and largely used by manufacturers. The current is made to pass through the ends of the metals that are to be welded, the heat being generated at the point of contact, and whether it be required to fasten strands of wire or the links of a watch chain, or to forge steel projectiles of war, the joints of rails, or the chain armor of an iron clad, the result is uniform. Shells and other projectiles used by the government are welded by this company, and there are here on exposition sheets of wrought iron, four inches thick, which have been pierced by shells at a distance of ninety feet, their lines of juncture still remaining intact. Thus also are welded metallic coils; fences and wheels are thus welded, the several processes being daily illustrated by machinery in operation. Side by side with small machines worked by hand are those whose beds are many feet in diameter, but the adjustments of each are so perfect that in every instance the welding is performed with the utmost precision.



PYRAMID OF COPPER WIRE

On the opposite side of the hall is another exhibit by a Boston firm, which also forges by electricity. Both companies manufacture switches, rheostats, safely appliances, and various apparatus for the transmission and regulation of the electric current, and by several companies are displayed cement-lined pipes and other conduits, chiefly for underground service. Makers of insulated cables and wires, tapes and compounds are mainly represented in the galleries, but on the ground floor a Massachusetts company has specimens of its so-called insulac, claimed to be impervious to oil and other substances which interfere with electrical circuits, and said to possess four times the resistive power of the finest grade



THE HOLTZ INDUCTOR

of shellac. As the discovery of a perfect insulating compound is one of the problems of the day, such exhibits are of special scientific interest.

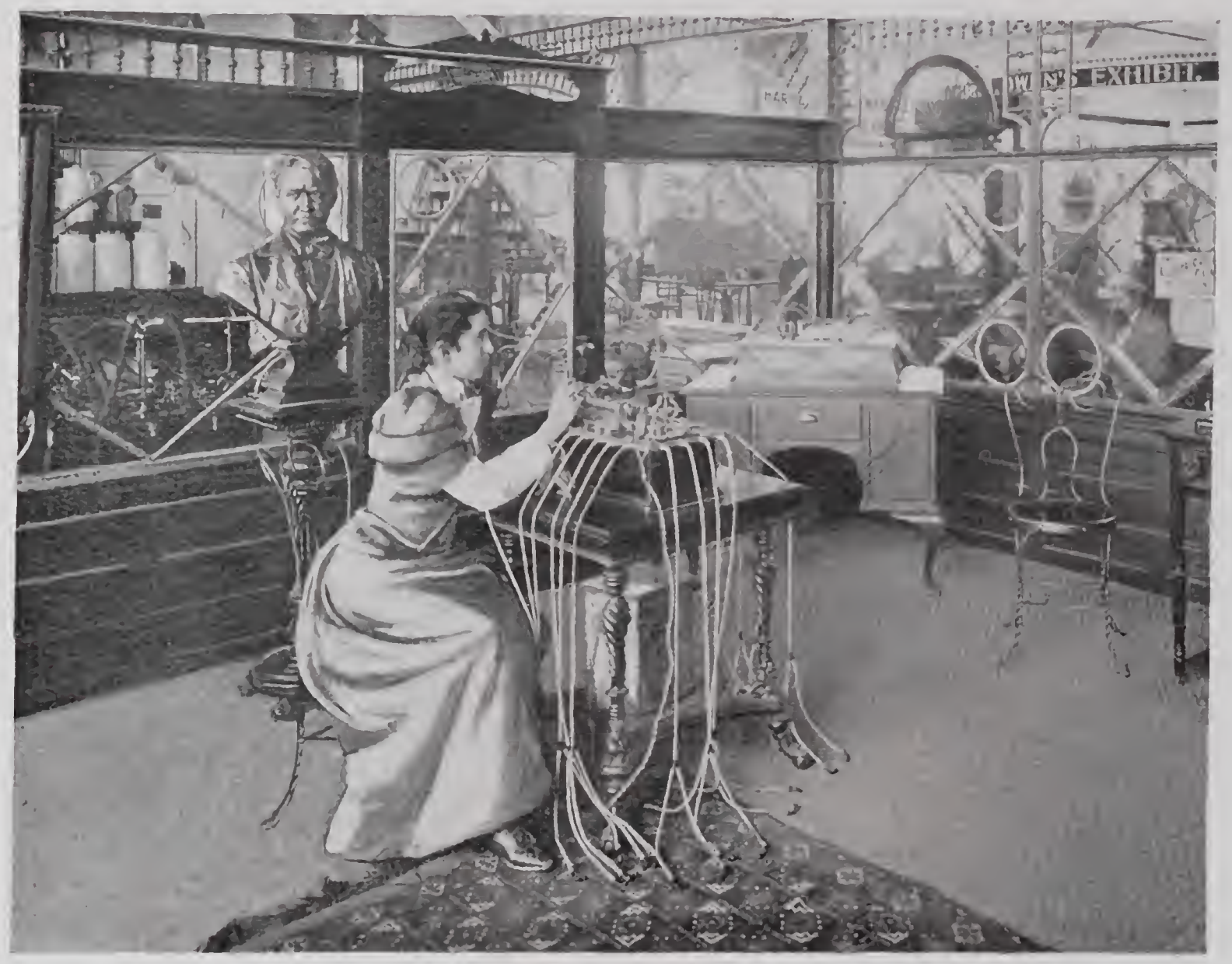
In various sections surrounding the main body of the hall is machinery, at times in operation, for electrotyping, plating, gilding, and nickeling, with such as is used for separating metals from their ores or alloys. A Chicago company shows the first electro-magnetic machine, made in 1844 for an English firm, claiming that its own apparatus is in the line of direct succession. Besides electrotyping and electro-plating, this company makes a specialty of polishing, lacquering, and buffing, a section of a walrus hide, thick and firm as a board, showing the chief material for the wheels used in these branches of work.



GRAY'S TELAUTOGRAPH

In the construction of electrical apparatus, as of other machinery, belting plays an important part, and here are on exposition many varieties specially made for operating dynamos and engines. Some of the belts are fastened with cement, and others with wire screws, but as a rule belting for heavy machinery should be perforated, and of such there is a large collection. By a New Hampshire firm is exhibited what is claimed to be the largest piece of link-belting in the world, 200 feet long by five in width, with a weight of 4,200 pounds, and in the construction of which were used more than 400,000 pieces of leather and metal.

Of the special mechanisms displayed in the galleries there are also a few exhibitors on the ground floor, their groups including appliances for lighting purposes, for surgery, dentistry, and the diagnosis of diseases. Among the first is a small battery and spark coil which can be attached to burners and used for lighting or turning off gas. This, it is claimed, is cheaper than matches, for the battery will last a year, and can be replaced for twenty-five cents. The largest exhibits of surgical and medical instruments are by a New York company, which confines itself to such as are used for cauterizing and diagnosis, and by a Philadelphia establishment which also covers this ground, and produces besides small dynamos, batteries, coils, condensers, voltmeters, testing keys, and the numerous minor forms of electric apparatus used by educational institutions.



EDISON'S PHONOGRAPH

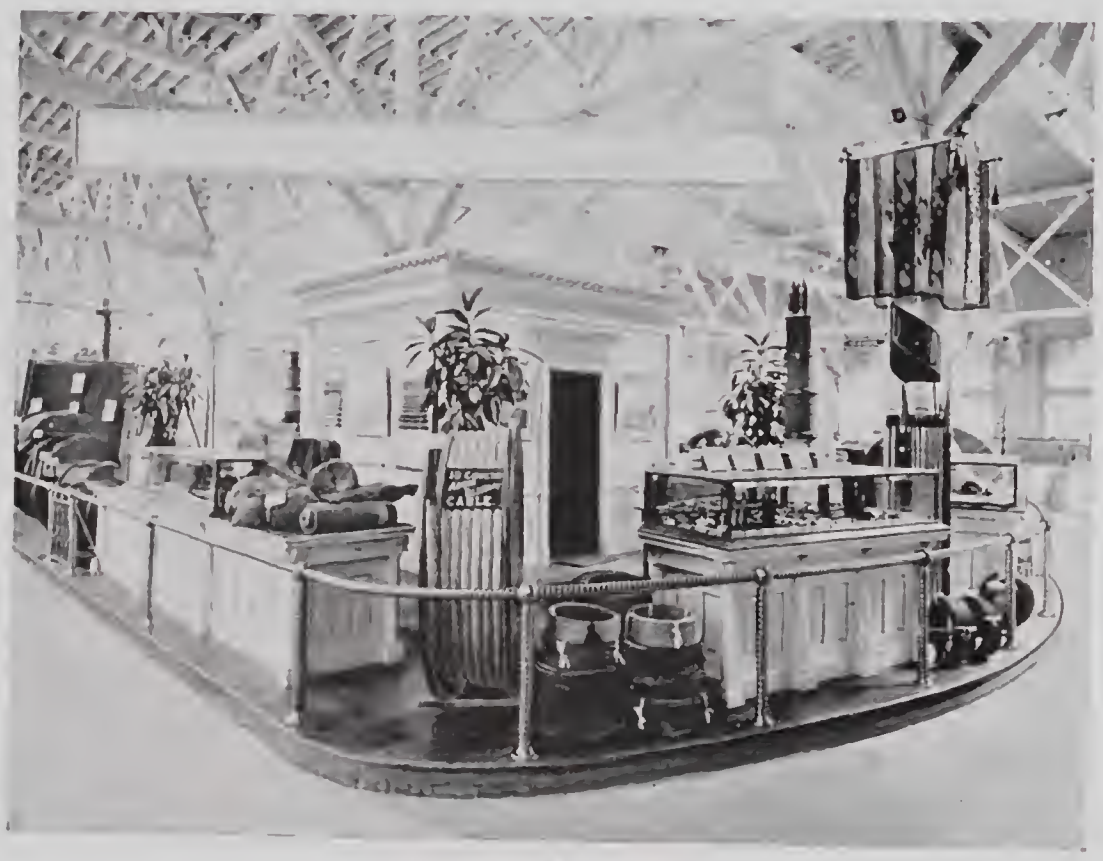
In the western galleries of the Electricity building are some of the most interesting of its contents, for here are several of the more remarkable among recent inventions. First of all may be mentioned the telautograph of Elisha Gray, who shares the honors with Edison and Bell in the domain of electricity. In 1887 he completed and later simplified the machine by which fac-simile writings or drawings are transmitted. As now exhibited, it consists of two instruments at either end of the telegraph line, both contained in a wooden case somewhat smaller than a type-writing machine. To the transmitter is attached a pencil, and near its point is a collar, to the opposite sides of which are fastened two silken cords, passing thence at right angles around a small drum, revolving on a vertical shaft,

to which is attached a toothed wheel, the latter, as it turns with every motion of the pencil, acting on the wire with which it is in contact. Two wires are thus required to transmit the writing, the escapement wheel of the receiving instrument responding to every motion of the drum, and the toothed wheel of the transmitter. At the receiving end of the line the order of the mechanism is reversed, the wheels being mounted on the shafts above the drums, with cords running from the latter to aluminum pens of the self-feeding or fountain type. As the wheels and drums are of the same size, the record made by the receiver is a fac-simile of the transmitted manuscript. The invention is of special value not only to business men, but to journalists, and those engaged in the detection of criminals.

In addition to the Edison exhibits of electrical appliances, forming a portion of the General Electric company's display, is a section in the southwest



TEMPLE BUILT OF CARBONS



DAY'S KERITE PAVILION

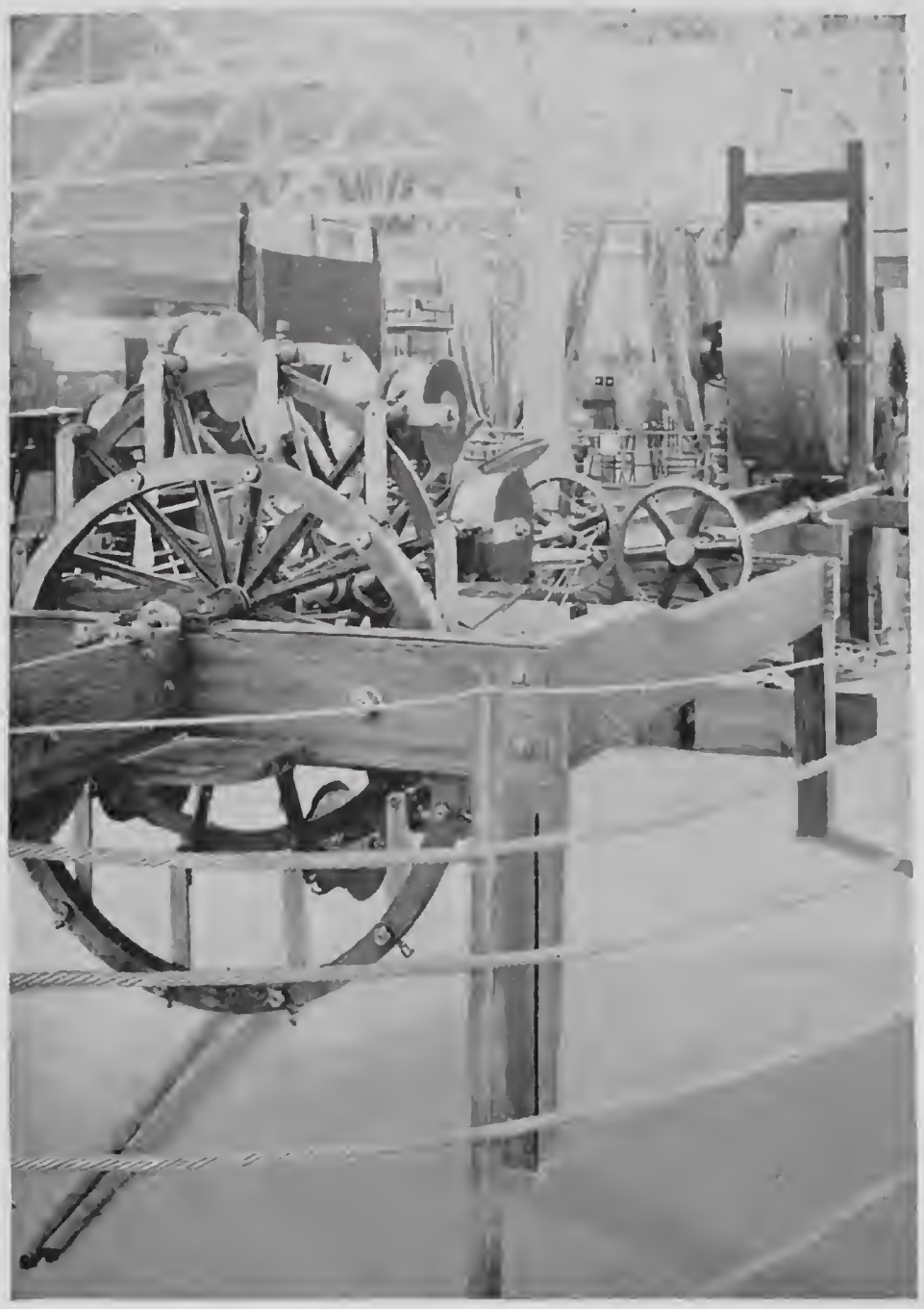
of tin foil then used for the purpose has given place to the hollow cylinder of wax, upon which, as it revolves, the point of the diaphgram cuts the lines of sound. Apart from the amusement derived from this machine, it is rapidly finding favor among professional and business men, taking the place of the amanuensis, while through its records scientists are enabled to make a more thorough investigation as to the nature of wave sounds.

In a brilliantly lighted pavilion is the ingenious exhibit of the Commercial Cable company, representing an enterprise founded nearly a decade ago by John W. Mackay, of California, and James Gordon Bennett, of New York. In general terms, it consists of a working model of their system, showing automatic transmitters, recorders, and other instruments of most approved and modern type. The hair lines of the recording machine are produced at the rate of about one yard per minute, the message being ground out from the other end by the automatic sender. Instead of being transmitted from New York to Europe via Nova Scotia and Ireland, the words are simply conveyed across the pavilion, but for all practical purposes the illustration is complete. In this collection also "faults" cut out of cables, showing the nature of the accident or defect one of the specimens having been crushed into an almost shapeless mass, and nearly severed by an ice-floe. There are also instruments for detecting breaks and injuries from whatever cause with a

gallery containing the instruments of the Edison Manufacturing company; and in this locality, more perhaps than elsewhere in the Exposition, is represented the genius of the inventor. When first it was reported that Edison had constructed a machine which would store conversations, speeches, songs, orchestral music, and any other sounds given into its keeping, and reproduce them at any future time there were many who refused to believe it, and not until his phonographs were displayed at the Paris Exposition of 1889, were all the skeptics converted. Since that date the sheet



TOWER OF INSULATORS



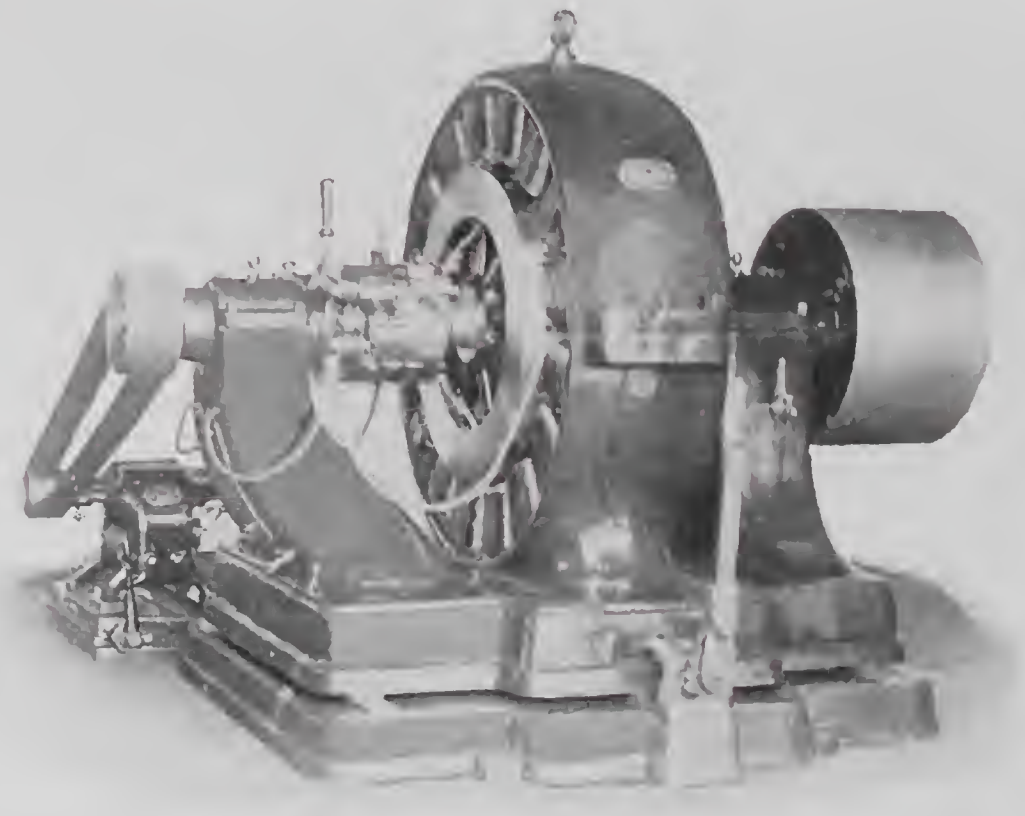
CABLE TWISTING MACHINE

machine that registers the amount of resistance which the current meets in passing through a given cable, each mile of the line being divided into units of resistance. When a break occurs in the current, the amount of resistance remaining is divided by the number of units to a mile, and thus the exact point of the damage is ascertained. In the centre of the group is a handsome model of the company's repair ship, *Mackay-Bennett*, all the cable machinery on deck being a reproduction of the actual apparatus, and illustrating the process of picking up and laying cables. Specimens of perfect cables are also shown, one of the latest pattern being intended for shallow waters, and to resist rough usage, for which purpose it is covered with short sections of heavy steel tubing, so adjusted as not to impair its flexibility.

As already stated, the majority of the electrical instruments used in surgery and dentistry, and in the treatment of various physical ailments, are to be found in the galleries. One of the most elaborate exhibits is that of a Chicago physician, whose specialty is an electric belt for which he claims wonderful cures of nervous affections. However this may be, the observer cannot fail to admire the pavilion in which he displays his apparatus. Adjacent to the Edison collection, a portion of the space is occupied by a handsomely furnished parlor, in which are valuable oil paintings. Near by is the exhibit of an electric medical supply company, consisting of stethoscopes, batteries, and appliances for electric treatment, cautery apparatus, and special contrivances used in surgery or dentistry. Among other curiosities is a small rubber cylinder containing a galvanic battery and an inhaler, designed to relieve the sufferer from nervous and inflammatory disorders.

In this vicinity are several groups of electrical appliances which illustrate the investigations of scientists and manufacturers with a view to discover the best insulating agency. There are sheets and conduits, compounds displayed in bulk, and various kinds of paint which, it is claimed, will effectually shut off the electric current from all disturbing influences. One that has attracted much attention is known as isolatine, and is exhibited by a New York house which also shows the many chemical substances used in the manufacture and operation of electrical appliances.



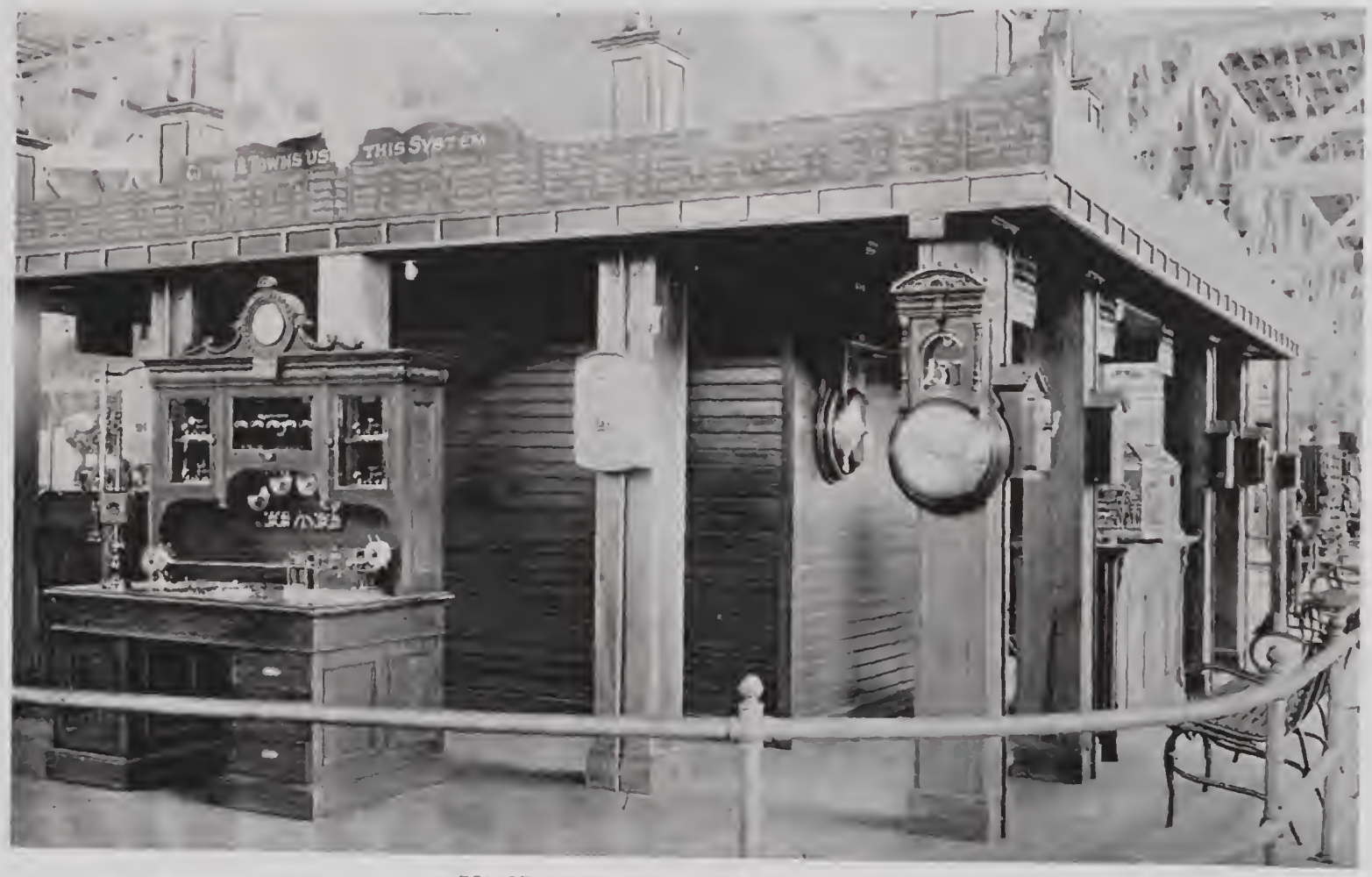


DYNAMO OF FORT WAYNE COMPANY

Elsewhere in this neighborhood may be studied the processes of gold and silver plating by electricity, and a simple yet effective machine by which any metal may be automatically engraved through the same agency. The letters are securely clamped, and as the stylus follows their outlines an electric current is formed, and a corresponding motion imparted to the graver. Little practice is required to operate the machine with satisfactory results for the simpler kinds of work. In these western galleries are also electric doors, automatic guest calls for hotels, burglar alarms, and clocks which record the rounds of the night watchman, such as are used by the government, and in the buildings of the Exposition.

Close at hand one may study the system of an electric signal company, in a neat railway model marked "dangerous;" he may have a suit of clothes cut by an electric machine, or may seat himself in an easy chair while his

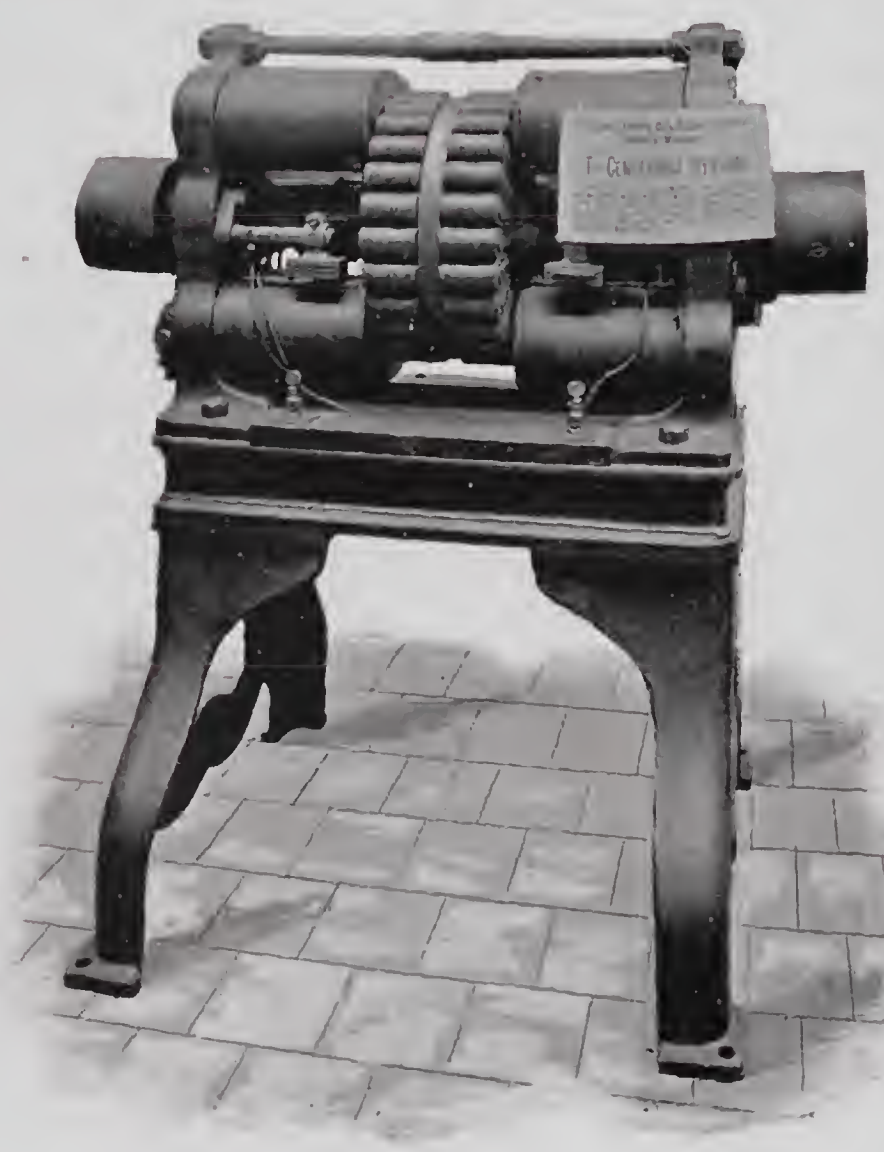
boots are polished by electric brushes. Here also is an electric incubator, with eggs in process of hatching. In one is a barely perceptible palpitation; another is heaving with suppressed activity; a third is partially opened, and from a fourth a pulp-like form has drawn itself partially into the world, and lays panting over its former prison walls, as if gathering strength to free itself. For hatching chickens by electricity, as compared with incubation by steam, the advantage is claimed that the needed temperature, a little over 100 degrees, can be made absolutely uniform, while the machine requires but little attention. From the time the egg is placed in the incubator until the chicken comes from the shell is an average period of nineteen days. Two jars of Mason batteries are sufficient to furnish the heat and operate the thermostat, the latter never varying more than one half of a degree. One of the most interesting features of this exhibit was the sealing of a machine containing a dozen eggs, which remained untouched until the chicken emerged in due time, and in as lively condition as though fostered by the mother hen.



POLICE AND FIRE TELEGRAPH APPARATUS

Three foreign powers have installed exhibits in the western galleries, Austria having chiefly a display of signal clocks and technical instruments, and Italy a small collection of china insulators contributed by a ceramic society of Milan. France has a large assortment of musical instruments, many of them overflow exhibits from the department of Liberal Arts, and having no relation to electricity. They consist of beautifully finished orchestral pieces, and include some fine specimens of inlaid work in wood and pearl, showing what may be done with pianos and other instruments in the way of cabinet decoration. There are several French inventions, some of which can be played as ordinary pianos, or by attaching them to other instruments. The music may be produced mechanically by turning a crank, or by electric self-acting machinery, and when the harmonies are combined the effect is often pleasing. More than fifty pianos are here, ranging in price from a few hundred to several thousand dollars. Of the new styles for which superiority is claimed, one has a frame of pure steel, and there is a French horn whose mouth is beaten from a solid piece of brass. In the gallery opposite this group is a row of tastefully furnished booths, the headquarters of the periodicals in the United States whose special field is electricity.

The principle that heat is generated by resistance to the electric current is illustrated in several portions of the building. Ovens and furnaces, and heating apparatus for railways, houses, factories, and public buildings, are exhibited on the ground floor, where also, as has been said, several companies show how welding may be accomplished by electricity. Other heating appliances are found in the galleries, a Wisconsin company which deals in novelties exhibiting a hair curler heated by electricity. But the most interesting application of this principle may be studied in the north gallery, where the housekeeper may see how her home can be comfortably warmed by electricity, and how her cooking may be done expeditiously and scientifically. The electric ovens are lined with wood and asbestos, which keep the heat within, and are supplied with doors of mica, and incandescent lamps and thermometers for ascertaining the temperature, and experimenting in all branches of cookery. As in other appliances, the electric current is governed by switches, the griddles, kettles, coffee pots, tea pots, flat-irons, and all other utensils having enameled bottoms in which are imbedded small copper wires. When the current is turned on and passes along the wires, the resistance offered by the enamel produces heat, which can be easily regulated and directed. For instance, in roasting beef, if one side of the piece is browning more rapidly than the other, instead of taking it out and turning it, the current is simply increased above or below as the case may require. The electric flat-irons weigh about eight



pounds, their upper portions being composed of non-conducting substances. Of all the companies which illustrate this phase of household economy, the Ansonia, of Chicago, has the most complete exhibit, presenting besides a display of cables, switches, batteries, motors, and a historical collection, including, as is claimed, the first of dynamos.

In the south gallery opposite are miscellaneous exhibits, one of which, by a Philadelphia manufacturer, is specially deserving of note. Upon an arched wall space, having a background of light blue, is a large eccentric, composed entirely of switches made by the company, and upon a small display board are the various patterns representing the evolution of these appliances. The first is one of a hundred made by means of a hand drill, hammer, and chisel, the later varieties, composed of porcelain and English ivory china, being of elegant workmanship, and forming a striking contrast to the others. Among the exhibits in this portion of the building may be mentioned that of a New York house, which presents many fine specimens of photo-engraving and electrotyping, the display being of plates only; also, the large pavilion adjoining containing several cases of finely wrought instruments.



GERMAN HISTORICAL COLLECTION

In the southeastern galleries is a pavilion surrounded by great coils of cable, and masses of a carbon-like substance, the latter the crude form of an insulating material known as kerite. The exhibitors manufacture insulating tapes and cables for underground and submarine use. A New York firm builds a cabin of wire ducts or conduits, and a Cleveland company erects a pillared structure composed of carbon, with pyramids and other forms within and around it. A manufactory of the same city occupies a considerable space with specimens of its handiwork in polished aluminum, brass, and nickel, arranged upon a large sample board which forms a background to the section. The specialty is a boiler alarm, which may be either in the form of a steam whistle or an electric gong, the danger signal being given when the water reaches the highest gauge, and the float raising the valve lever which releases the mechanism.

Safety appliances for the public are seen in the many devices of the telegraph systems which have been adopted by the fire and police departments of all large cities. A New York company which has furnished complete telephone and signal systems for many large cities exhibits its apparatus around a square pavilion, on whose cornices are the names of municipalities in which they are used. Near this is a booth, from which float the national colors of Brazil, whose government manufactures its own telegraph and telephone instruments, as here represented. A large map is displayed locating the telegraph lines of the republic, and in book and pamphlet form is described the present condition of the system, and its development through native skill and ingenuity.



GERMAN ELECTRIC APPARATUS, TELEPHONES, ETC.

The exhibit of the Western Union Telegraph company is contained in a large plain pavilion, over whose main entrance are the words, "What hath God wrought," forming the first telegraphic message sent by Samuel Morse. In a case within is a photograph of this message, and the original Morse machine, side by side with the perfected instrument of 1893. Several portraits of the great inventor are hung upon the walls, with those of Cyrus W. Field, the father of the submarine telegraph system, and Thomas T. Eckert, who succeeded Norvin Green as president of the company. The pavilion also contains busts of Morse by the sculptor Greenough, and of Field, by Hartley. Several of Field's medals and other personal souvenirs are included in the collection,

together with a reproduction of the *Great Eastern*, which laid the first cable, the model being loaned by one of her commanders, with various apparatus showing the workings of the system, now some quarter of a century old. On one of the maps are indicated the locations of the Western Union lines, which include 750,000 miles of wire; and on another is a model in relief of the bed of the Atlantic ocean, in which may be traced the systems operated by the Western Union, Anglo-American, Mackay-Bennett, and other submarine companies. This is the first profile chart of the kind, and was made by Captain Dutton, formerly of the cable ship *Faraday*, of which also a model may be seen in the company's pavilion. But perhaps the most attractive exhibit is the huge, rusty grapnel, with its five prongs, which in 1866 recovered the cable lost during the previous year in nearly 2,000 fathoms of water. The cable had parted 1,100 miles from Valentia; the attempt to recover it was abandoned for a time, and a new line constructed.

With the exception of the Western Union's exhibit, and a small display of dry batteries, Germany occupies all the northeastern galleries with her well arranged collections. One large department is devoted to the exposition of optical, surgical, electro-medical, and scientific apparatus. A curious exhibit is that of artificial eyes, some of them such exact imitations of nature that when examined from different positions their pupils appear to dilate or contract. Another collection illustrates the diseases peculiar to the human eye, and its normal condition as observed in the German, Slav, Roman, Gaul, Mongolian, and Negro. In this section are some finely executed anatomical models, respiratory apparatus, a large operating table, and a complete collection of surgical instruments, the last furnished by the purveyor to the Prussian armies. More picturesque than these groups is the exhibit made by the German postal service, consisting of model post and telegraph offices, as well as reproductions of many in operation, and articles which constitute the entire working outfit of the department. There are models of telegraph towers and of imperial postal cars; telegraph instruments of the Hughes type, upon which the operators play as if upon pianos; telephones of German make, cumbersome as compared with those of American manufacture, and maps showing the distribution of telegraph lines and post-offices throughout the empire. Telephones enter largely into the telegraphic system of Germany, with some 80,000 in use. An important factor of the postal service is the pneumatic tube, and in this department is a miniature plant showing its operations. In another section are models of mail coaches, representative of early and modern times, while here is also illustrated the service of mounted messengers established along the river Spree in the fourteenth century.

The portion of the gallery which is above the eastern entrance to the building has been transformed into a court, approached by a broad stairway, the background and dais being festooned in crimson and gold, and bordered with evergreens, showing for its central object a bronze bust, mounted upon a massive pedestal, of the late Werner von Siemens, the famous German electrician and inventor. On either side are busts of Soemmerring, announced as the inventor of the first galvanized telegraph, in 1809, and of Reis, inventor of the first telephone, in 1861. In the background also are medallions of Gauss and Weber, proclaimed as the joint inventors of the first electro-magnetic telegraph, operated in Göttingen in 1833. Fronting the busts and medallions, and arranged on the ledges of the enclosure, are the instruments, or their reproductions, designed to illustrate the historical development of the application of electricity in Germany. Here is the magnetic needle telegraph of Stöhrer, 1817, Reis' telephone apparatus, and a number of inventions by Siemens, including the dynamo of 1866, and his instruments for telegraphic printing and writing. There are also collections of ringing apparatus, electrical appliances and signals for railroads, lighting machines, samples of cables chronologically arranged, indicators, alarms, stone drills, mineral separators, and clocks, with other mechanisms showing that the Germans have won for themselves a leading rank in every department of electrical science and invention.

World's Fair Miscellany.— The first general illumination of the Electricity building was on the evening of the 31st of May, and attracted many thousands of spectators. By eight o'clock the structure was one blaze of light, with myriads of incandescent lamps with revolving wheels displaying all the colors of the rainbow in ever-changing hues, and with unseen pens writing mysterious inscriptions on the walls in letters of fire. But in the very centre of the building was a huge shrouded figure which loomed ghost-like almost to a level with the rafters. Presently the chief of the department stepped forward; a moment later the shroud was withdrawn, and the Edison tower and the classic pavilion at its base stood revealed in all their cold, chaste beauty of outline. But for a few seconds only; the glare of search-lights focused upon them, causing their dark surface to shine with a dazzling radiance. Then the crystal bulb at the top burst into flame, flashing like a crown of diamonds; and finally the entire column was arrayed in robes of purple light like a pillar of fire. It was the very apotheosis of electricity, and by a thousand voices was shouted the name of him by whom these marvels had been wrought.

The illuminations of grounds and buildings begun in May, were continued throughout the term of the Fair, at first on alternate nights, and then every night in the week except Sunday nights. Occasionally the admissions after dark were larger than during the day; but as the novelty wore off, and the average daily attendance gradually increased from 20,000 or 30,000 to 150,000, the proportion was not maintained. During one of the first illuminations, Machinery hall narrowly escaped destruction by fire. The shed that inclosed the machinery of the Westinghouse company's engines, by which at the moment power was furnished, was set ablaze through the burning out of one of the connections, caused by the pressure on the wires. Only through the promptitude and coolness of the men in charge a conflagration was averted which would have swept the building out of existence.

The light for the fountains with their prismatic hues and chameleon-like changes of color, was produced in a subterraneous chamber, with which the fountains were connected. The lamps resembled the search-lights on board a man-of-war, except that for the lens used at sea was substituted a silver-lined parabolic reflector, from which the rays were shot upward for a distance of 150 feet. The lighting capacity of the lamps was controlled by a mechanism similar to clock-work, and could be intensified to a brilliancy of 350,000 candle-power. The water effects were also regulated in this mystic chamber, to the orifices of which a nozzle was attached, and through it the water projected in columns, jets, or sprays, with electric light playing upon them in varying hues from color screens beneath.

While electric light and power have been prominent factors at former expositions, they have never been so largely used and applied to so many purposes as at the Chicago Fair. At the Paris Exposition of 1879 there were some 1,500 incandescent lamps, and at the New Orleans Cotton Centennial in 1881 both arc and incandescent lamps were utilized to good effect. At the latter it was for the first time demonstrated that under this clear, white light, the delicate tints of flowers are almost as plainly visible as beneath the noon-day sun. At the Louisville Exhibition of 1883 there were 6,000 Edison lights, and at the one held in Paris in 1889, there were 1,000 arc and 9,000 incandescent lamps, both considered at the time a wonderful display of electric lighting. But in the buildings and grounds at Jackson park there were 6,000 arc and 120,000 incandescent lamps, the former each of 2,000 candle-power, while motive force of from 4,000 to 5,000 horse power was generated for purposes mentioned in the text.

In the Electrical building was installed apparatus of all descriptions excepting generators, which were located elsewhere. Power, for whatever purpose used, was furnished and transmitted, as I have said, from the station at Machinery hall, the plant being so constructed as to be complete in itself, and yet composed of numerous smaller plants.

The floor of the building was intended to sustain a minimum weight of 150 pounds to the square foot. By railroad derricks machinery of a weight not exceeding fifteen tons could be moved into position, and generating machinery up to a weight of twenty-two and a half tons could be handled by travelling cranes.

Neither for illumination nor other purposes were any of the wires placed above ground, all being fastened on insulators inclosed by subterraneous conduits. The arc lights scattered throughout the park were supported by pillars or masts twelve feet high, most of them 50 to 75 feet apart, and all arranged with a view to landscape effect.

Side by side with the Edison exhibit of incandescent lamps was a case containing many sections of fibrous vegetable growths, used by the inventor in his search for the substance best fitted for a lamp filament. The selection finally made was that of a Japanese bamboo, which is now extensively cultivated on special plantations. It is said that in arriving at this result, Edison travelled many thousands of miles, and expended at least $200,000.

Near the pavilion of the Commercial Cable company a Fort Wayne establishment had an exhibit which overtopped all others in the galleries. It consisted of iron towers and poles such as are used in railroad construction, and for street lighting.

Nikola Tesla, the so-called wizard of physics, whose current motors are mentioned in connection with the Westinghouse company's exhibits, is one of the youngest of our great electrical scientists, and yet a man of world-wide repute. His fame rests mainly on his multiphase alternating motors, whereby are produced high potential currents of remarkable frequency. On the 25th of August he lectured in the assembly room of Agricultural hall before an audience consisting largely of electrical engineers and scientists. During his discourse he exhibited a motor or oscillator driven by compressed air, which made 80 vibrations to the second, stating that he had made others capable of several thousand vibrations to the second. To this he attached a dynamo small enough to be slipped into the pocket, and yet of considerable power.

Elsewhere is noticed the exhibit by the seismological laboratory of the Imperial university of Japan. As stated, the first instrument to record motions of the earth was invented by a Japanese more than seventeen and a half centuries ago, but it was not until 1875 that an observatory was built for the purpose in Tokio. The first instrument used was the one invented by Palmieri, the director of the observatory on Mount Vesuvius: but since 1884 this has been replaced by the Milne instrument, which records horizontal and vertical motions, with the time and duration of shocks. This year also marks the commencement of a system of investigation covering the entire empire, the observatory publishing guides for noting and reporting seismic phenomena, with or without the aid of instruments. These were distributed among hundreds of officials and others whose reports were transmitted free by the postoffice. From these maps have been made showing the disturbed areas of the 3,800 earthquakes which have occurred throughout the empire from 1885 to 1890, as well as their relative intensity. Observations since that year have greatly added to previous records, especially those of the great earthquake of October 28, 1891. In this the centre of disturbance was almost in the middle of the main island, though with shocks more or less severe almost throughout the empire. Within a comparatively small radius over 7,000 people were killed, and 142,000 houses totally destroyed. The ground was rent and cracked, permanently depressed or upheaved, thousands of landslips were produced, water and sand were ejected, multitudes of embankments shattered, railway lines twisted, and bridges hurled into rivers, which, with other havoc, was graphically depicted in the Japanese section of the Electricity building.

The enormous switchboard exhibited by the Brush Electric company was sold through its agents in Yokohama for the use of a power station now being erected in Manila, Philippine Islands, the company also furnishing several dynamos.





EAST ENTRANCE HORTICULTURAL BUILDING



CHAPTER THE FIFTEENTH

HORTICULTURE AND FORESTRY



TO him who reads aright the lessons of the Fair, one of the most significant is that the nations of the world are coming nearer together than ever before, and among its highest aims is to hasten this process of unification. Through the activities of man, even the vegetable kingdom is becoming, as it were, a universal brotherhood, and intelligently viewed, the Horticultural department not only affords an opportunity for comparing the products and methods of foreign lands with those of the United States, but offers a panoramic view of the entire vegetable world, its scenes of course shifting with the changing seasons, and though here described in the present tense, displaying innumerable phases such as neither pen nor picture can delineate.

Under the general term horticulture are included, for the purposes of the Exposition, viticulture, pomology, and floriculture, wines, fruits, and flowers being displayed in all stages of development. By means of photographs, books, and appliances are illustrated the modern management of vineyards, and methods of manufacture, bottling, packing, and shipping. In the pomological sections are fresh, dried, preserved, and canned fruits. In a miscellaneous department are nuts, jellies, vinegars, ciders, etc. Here also are mills and presses, and the latest inventions for drying and preserving fruit. Floriculture appears, decked in robes of beauty, gigantic palms and tropical plants forming a background to delicate ferns and flowers. Another subdivision consists of floral designs and flower stands, with ornamental plants and grasses, and literature relating to their growth and training. Vegetables and seeds, with all the best appliances for ornamental and landscape gardening, are also grouped under the general heading of horticulture.



Fronting 1,000 feet on the lagoon, and with an extreme width of 250 feet, the Horticultural building covers an area of five and three-quarter acres, and with its greenhouses, and other adjuncts, of eleven acres. But as to the size of this structure, and of the other principal structures of the Fair a better idea may be conveyed by stating that the former, though one of the smallest of the group, is almost as large as the Crystal Palace, in which has been partially preserved the home of the London Exhibition of



HORTICULTURAL BUILDING, FROM WOODED ISLAND.

1851, and that it contains some 90,000 feet more of exhibiting space than all the three edifices used for similar purposes at the Philadelphia, New Orleans, and the last of the Paris expositions.

While intended mainly as a spacious conservatory, in structural design the Horticultural hall by no means suffers from comparison with its more ambitious neighbors. In a word its plan may be stated as including a central pavilion, more than 200 feet square, surmounted by a crystal dome, and connected with smaller pavilions at either end by two longitudinal series of galleries, glass roofed, from 50 to 70 feet in width, and inclosing garden courts, each somewhat more than half an acre in extent. A feature of the edifice is its decoration in alto and basso relievo, the frieze



MAIN ENTRANCE









1 AUSTRALIAN TREE FERN, 27 FEET HIGH
2 STAG HORN FERN
3 AUSTRALIAN PLANTS
4 CACTUS FROM U. S. BOTANICAL GARDENS, WASHINGTON, D. C.
5 SOUTH SEA ISLAND TREE FERN



EXIT FROM CRYSTAL CAVE

which is six feet in height, and extends along three of its sides, displaying the handiwork of a cunning artificer.

As to interior effect the arrangement of the building is admirable, and if exception has been taken to the depression of the dome, whose height of 115 feet is barely two-thirds of its diameter, it will be observed that the long, low façades of the conservatory forbid such towering aspirations as are not inappropriate to the more substantial structures of the Exposition. Moreover this seeming disproportion is relieved by the curved glass roofs of the galleries on either side, by the lower domes at its base, and by the crown with which it is surmounted.

By the architects, Jenney and Mundie of Chicago, was adopted in their decorative plan the style of the Venetian renaissance, while the walls of the front galleries and those which surround the side pavilions are divided by pilasters of the Ionic order into windowed bays, thus reducing the wall surface to the smallest possible area. At the principal entrance, from the terrace fronting on the lagoon, is a triumphal arch, the vestibule of which is profusely decorated with statuary, and on either side of the main pavilion are groups of sculpture fashioned by Lorado Taft, one representing the awakening of the flowers, and the other their repose at spring and autumn tide. These are among the most chaste and expressive of all the artistic embellishments of the Exposition buildings, and standing forth in bold relief under the vault of the central dome, form the complement of the architectural design.

From the promenade gallery encircling the dome, the hall itself, with its wealth of plant life and floral decoration, presents one of the most striking kaleidoscopic vistas contained in this city of wonderland. Rising nearly to the summit of the dome is a miniature mountain, gigantic ferns, and palms, creepers, and flowers of brilliant hue, giving to the scene a rich tropical aspect. Above are great hanging baskets, and at the base, around a border of green fringed with blossoms, the sago palm, Abyssinian banana, screw pine, and other striking forms of tropical vegetation. From the gallery also may be seen to excellent advantage the gigantic forest growths of Australia towering roofward like the pillars of a temple, and in a conservatory opposite the softer floral beauties of the United States.

If less picturesque, the central galleries furnish exhibits no less entertaining than those on the ground floor. Among them is a large collection of views of the botanic gardens in Sydney, New South Wales, which have sent so many of their treasures to the Fair. The gardens of the Imperial university at Tokio are also well represented by photographs, and another interesting feature is the artificial fruits of the Yokohama Gardeners' association. Photographs of famous gardens and nurseries in the United States, diagrams of public parks in Colorado, Oregon, and elsewhere, with the models of villa gardens which line other sections of the wall, indicate that a principal object of this gallery exhibit is to illustrate the latest methods of landscape gardening. Then there are richly stocked herbaria, especially from the western states, and thousands of pressed plants and flowers tastefully displayed in revolving frames. One of the most remarkable collections was made by a woman of Colorado, who for



WEST SECTION OF FERN MOUNTAIN



LOOKING INTO THE VITICULTURAL HALL

months climbed its lofty ranges, and travelled over foothills and plains, contributing in no less than a thousand varieties an almost complete display of its flora. The mouse-fungus, with rust, blight, mildew, rot, and all the pests and plagues of the vegetable kingdom are here exemplified, and there are odd conceits for fences, rustic vases, and other garden ornaments, with collections of dried grasses, and preserved flowers made into wreaths, baskets, and other designs.

Descending to the base of the miniature mountain the visitor finds in this neighborhood, almost side by side with tropical exhibits, special displays from New York, New Jersey, and Pennsylvania, the leading floricultural states. Palms from Australia and the Americas lift their graceful fronds, and here are represented the choicest treasures from the conservatories of millionaires, such men as the late Jay Gould, A. J. Drexel, George W. Child, and Erastus Corning. Here also an Indiana century plant first displayed its yellow flowers, with others of its kind on exposition, all under the great dome, and in the adjoining conservatory, while France shows the rich masses of rhododendrons in which she takes a national pride.



UNDER THE DOME

A broad avenue passes around the miniature mountain, and along its outer edge New York and Pennsylvania again present their floral displays. In one corner is an elegant booth in which are plants, hanging baskets, cut flowers, and floral ornaments and designs—a contribution from the empire state. A few steps further is a collection of New Jersey snap-dragons, and other insect devouring plants. In this locality is also a collection of plants from



FLORAL DEVICE IN ROTUNDA



HORTICULTURAL BUILDING, FROM SOUTHEAST CORNER



the executive mansion, at Washington, the most striking of which is the so-called crown of thorns.

Forming a portion of the New York display is a large model of the national capitol, constructed of Canadian thistles, and near this are several large beds of Pennsylvania cacti, one of them alone containing three hundred varieties. Stepping into a small chamber in the form of a cave beneath the mountain, we find here a miniature reproduction of the famous Black Hills cave in South Dakota, with the stalactites and crystals which form the cathedral chimes, the bridal chamber, and other well known features, all represented with remarkable accuracy.

Entering the southern conservatory from the rotunda, we find ourselves in the midst of a profuse display of orchids and ferns, presented mainly by the New Jersey firm of Pitcher and Manda, whose exhibits are a prominent feature in the floricultural department. The orchid groups, which include private collections from Albany, Philadelphia, Jersey City, and other localities, are in truth one of the leading attractions of Horticultural hall, but as a considerable proportion of the 4,000 or 5,000 existing species, with all their varied forms, their brilliant hues, and delicate odors, is here on exposition, a detailed description would be obviously out of place.

Further to the south the women of Texas have their exhibit, those of Galveston contributing Cape jasmines and sweet bay trees, while Laredo sends a large bed of cacti, both of which attract many visitors to this section. Missouri's display adjoins a grove of palms near the centre of the conservatory, and includes many rare and beautiful plants from the botanic gardens of St Louis. Here also Pennsylvania has another large exhibit; Massachusetts occupies a limited space, and other states have scattering contributions. In the Illinois display are fine specimens of the bay laurel, and Indiana has a flourishing group of begonias. In this conservatory of the states is also a bed of cacti representing the botanic gardens at the national capital.

Corresponding to these exhibits south of the central court, is one in the northern section showing the floricultural collections of foreign lands. In the centre are the huge tree ferns from Australia, some of them forty feet high, with other plants of that species whose leaves are in many fanciful shapes. Here also are the staghorn ferns, from seven to eight feet in diameter, and as many in height, clinging to trunks of teak-wood trees, whose vitality has been exhausted in their embrace. At their feet are more delicate ferns with mosses, grasses, and many of the creepers which grow in

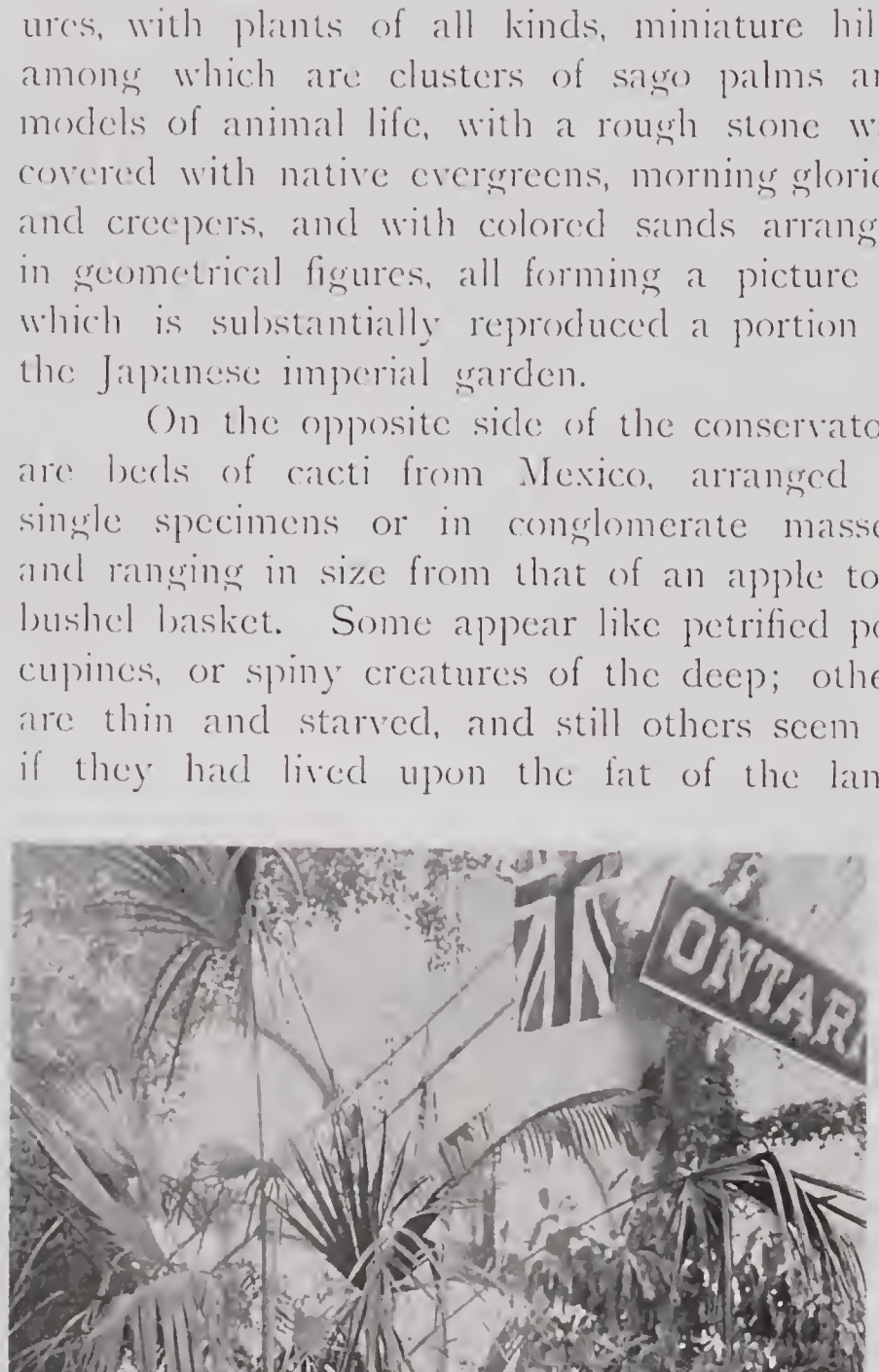


EXHIBIT FROM THE NATIONAL CAPITOL

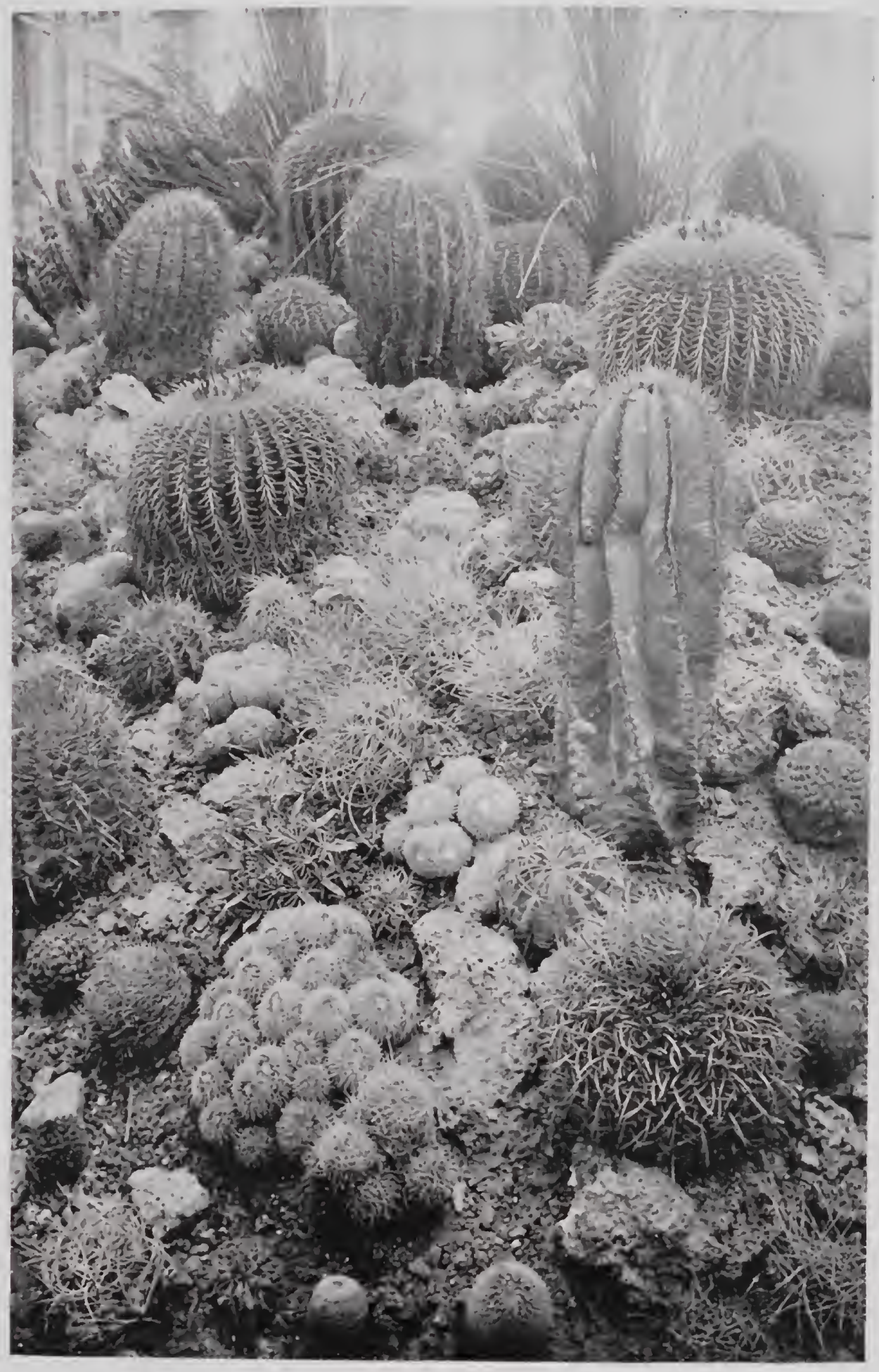
profusion amid Australian forests. In the Canadian exhibit adjacent, Ontario has many varieties of palms and ferns, eighty in number, and most of them from the horticultural gardens at Toronto. Among the former, one of the most remarkable is known as the Sabal Anderson description. Of other trees and plants, including cacti, flowering shrubs, and ornamental leaf plants, there is also a large collection.

Further toward the north is the Japanese garden, arranged in the simple, artistic fashion for which that people is famous. A rustic bridge spans a small pond, filled with gold fish, and fringed with water lilies and ornamental plants. Near by are the quaintest of urns and vases, containing orchids and other floral treasures, with plants of all kinds, miniature hills, among which are clusters of sago palms and models of animal life, with a rough stone wall covered with native evergreens, morning glories, and creepers, and with colored sands arranged in geometrical figures, all forming a picture in which is substantially reproduced a portion of the Japanese imperial garden.

On the opposite side of the conservatory are beds of cacti from Mexico, arranged as single specimens or in conglomerate masses, and ranging in size from that of an apple to a bushel basket. Some appear like petrified porcupines, or spiny creatures of the deep; others are thin and starved, and still others seem as if they had lived upon the fat of the land.



ONTARIO PALMS



BED OF TEXAS CACTI

This exhibit, as well as the other cactus beds scattered throughout the department, is specially typical of America. One of the most prolific of the forty or fifty species is the elephant tooth cactus, bearing a flower like a rose or lilac, red or crimson fruit succeeding the blossom. The fig cactus is similar in shape to the fruit from which it is named, its pale yellow flowers giving place to an edible product resembling the gooseberry, which serves as food for the cochineal insect, and at times for the inhabitants of Mexico and Central America.

Beyond the cacti bloom the cannas and begonias of Great Britain, and the azaleas of Belgium, and Germany. Especially noticeable is the German display, neatly and artistically grouped around a central fountain. At the upper end of the conservatory, beyond the banners of Australia, and the white and red flags of Japan, are the tropical plants of Trinidad, and above her exhibit rests, on a large pedestal, the golden lion of Britain.

Between the main hall, the pavilions, and their connecting curtains, are two spacious courts, the one to the south occupied by large basins or tanks filled with aquatic plants. In the northern court is a vault-like pavilion, 189 by 135 feet, constructed of iron, and stocked with South German wines. The façade and roof are adorned with appropriate statuary, and the walls

are covered with paintings illustrating various scenes in the wine producing districts of the German empire. The vine-clad banks of the Rhine and the Necker, the famous district of Moselle, the wine industries of Baden and Alsace-Lorraine, are all depicted in graphic art, while plaster casts and a sparkling array of wines in bottles complete this display from the fatherland. The historic monument of Germania and the Rhenish castle of Ehrenfels are reproduced, as models, in the entrance hall of this structure. The exhibits of wine are arranged according to locality, each specimen being labelled, and grouped with reference to the vineyard, village, or district where it was produced.

Apart from this the collection of wines is in the southern extremity of Horticultural hall, where Spain, France, and Germany, California, Australia, and other countries vie with each other in the quality and artistic grouping of their exhibits. Spanish ports and sherries, fashioned into pyramids, are displayed in a gaudy pavilion, or series of arched, open structures. Sometimes the towers are formed of solid bottles; again the base is made of casks and barrels, with rows of bottles let into their sides. Within these glistening piles are real sherry wines from the Xerez district, the strong, dark vintages of Valencia, and lighter, sweeter grades from the Spanish sierras, from whose vineyards also come the grapes which are made into Malaga raisins.

A large portion of the French collection consists of sparkling champagnes, including a tastefully arranged exhibit from Rheims, its ancient home, and, with Epernay, still its most important centre. An immense bottle reaching nearly to the ceiling of the hall may be considered as a monument to the Benedictine monk, who, two centuries ago, gathered the wines from the districts surrounding Rheims, and by mixing them made the first champagne that history records. The white wines of the Sauterne and Gironde districts, the rosy Medocs, clarets, and Burgundies, and a dozen other brands appear in various devices, as contributions from exhibitors in Bordeaux, Marseilles, Paris, and Nancy. Cordials and mineral waters are also in plentiful supply, and models of machinery, as well as of vineyards in the famous districts of Medoc and Gironde, serve to break the monotony of endless rows of bottles. In photographs and charts are shown all the insects which injure the vine, and their mode of attacking it, the king of them all, the phylloxera, receiving the lion's share of attention.

The German display in the southern section of the hall is a large and massive exhibit, of more general character than the one already mentioned. Worthy of note are the sweet, mellow wines of Rhenish Bavaria, the red wines of the Ahr, and the stronger products of vineyards planted on the banks of the Rhine; but most of the principal wine-producing districts of the empire, with their output of nearly 100,000,000 gallons a year, are here represented. In this collection also is a large assortment of beers and brandies, of cider, temperance, and



AUSTRALIAN TREE FERNS



FROM THE GOULD CONSERVATORY, HORTICULTURAL HALL



MEXICAN EXHIBIT OF CACTI

all other beverages that find favor in the fatherland.

Adjacent to this, and in the southwestern corner of the viticultural pavilion, is the display of California wines, by far the largest and most attractive of our domestic collections, its effect increased by the skilful grouping of the exhibits and the ingenious structure which contains them. A red cedar pavilion, 40 feet in height, is fashioned so as to resemble one of her giant trees, the main entrance having the appearance of an archway built of rocks, while around the trunk are various figures emblematic of viticulture. The goddess of the vine is crowned with a tiara of vines and grapes, and toward her an Indian girl is approaching with fruit-laden basket. A padre, with spade in hand, represents an early stage of the industry, and a huge grizzly bear is a character in Californian history which requires no introduction. From the gallery a staircase leads into the pavilion, so that the visitor may pass either from the ground or upper floor to the exhibits within.

Passing through the main doorway, we pause for a moment before a large panoramic view of the Golden Gate and the harbor of which it is the portal. Then turning to the exhibits, we notice first of all the collective display of several of the largest vintners and viticulturists, whose cellars in San Francisco and elsewhere contain larger stores of wine than those which Hannibal wasted, when, on his march toward Rome, he bathed his horses' feet in the choicest vintages of Italy. Of some of the vineyards, covering their thousands of acres, there are paintings by local artists, with tablets and appropriate mottoes. A favorite corner of the viticultural hall is in the shape of a redwood tank, garlanded with vines, and forming, with its contents, the exhibit of several large producers of Sonoma county, prominent among whom is an Italian-Swiss colony. In a separate structure are also represented the great vineyards and cellars of the late Leland Stanford, at Vina, in the Sacramento valley, its court opening through an arched entrance way into a spacious vault, lined on either side with barrels of huge proportions. In pictures are also reproduced these famous vineyards and wine cellars, together with the bonded warehouse in which at times is stored $1,000,000 worth of brandy. From Napa, Sonoma, Santa Clara, Alameda, and other counties there are smaller exhibits, all contributing of their best toward a combined display representing one of the foremost of Californian industries.



JAPANESE DWARF CEDAR

Not the least valuable exhibit is that of the State Viticultural commission, consisting of



JAPANESE EXHIBIT



GERMAN FLORICULTURAL DISPLAY

practical and reliable descriptions of viticulture as pursued in California. On either side of its space are growing vines, above which are photographs of grape clusters, showing the best varieties for the production of wines, brandies, and raisins. Famous vineyards are also depictured, and in a colored series of state and county maps are shown the areas planted in many varieties of grapes.

From a few hundred acres of vineyard planted by the padres and their neophytes during the pastoral days of California, the area under cultivation increased to nearly 200,000 acres in 1892, with more than 150,000,000 vines, yielding, in full maturity, an average of three or four tons to the acre, a ton of grapes producing about 120 gallons of wine. It is not until recent years that the viticultural interests of California have assumed any large proportions, or indeed that here were known either the art of producing marketable wines or the grapes best adapted to the purpose. As late as 1860 the bulk of her wines was made of mission grapes, such as the Franciscan fathers transplanted from Mexico, and from which was extracted a light colored beverage, heavy, and rank of flavor. Later, many foreign varieties were introduced, largely through the efforts of the commission; and presently wine-making was based on scientific methods, and became a fairly profitable industry. Then came over-production, for as yet the demand was only for local consumption; but gradually California wines gained a foothold in eastern and European countries, especially in France, where they are doctored and often returned in adulterated forms, to be sold under foreign labels at from three to five-fold their original cost. In 1881 more than 3,000,000 gallons were shipped to the Atlantic states; in 1890 more than 12,000,000 gallons were forwarded by rail or sea, and of the present output, averaging some 20,000,000 gallons a year of wine, and 1,500,000 of brandy, or more than one-half the entire yield of the United States, at least 70 per cent is shipped to eastern and foreign markets.



ELEPHANT EARS LILIES

Aside from California, the most elaborate of domestic collections are from New York, Ohio, and Missouri. The dry wines, champagnes, and brandies of the empire state are especially noticeable; exhibitors from Ohio and the region bordering on Lake Erie group their specimens in and around an elaborate column of bottles, and two of the most prominent wine companies of Missouri show their samples in neat and tasteful pavilions. New Jersey is also well represented, and among her participants is one of the oldest of German wine makers in the United States. From Manassas, Virginia, comes a specimen of her vintages, and there is wine from a vineyard planted on the battle-field of Bull Run.

Near the French section are towers and pyramids of bottles filled with the red and white wines of New South Wales. Photographs of her vineyards show that they are large and thrifty; and here also the information is conveyed that among the more important of native red wines are Burgundy, claret, and hermitage; of sweet wines, Muscat, port, and sherry; of white wines, hock, Madeira-dry, Shiraz, and Tokay. Australian vintages, it may here be observed, are gradually finding favor in European markets, with exports to England alone of 200,000 or 300,000 gallons a year. Already the tentative stage has been passed, and many varieties will bear comparison with the lighter wines of French production, while for domestic use they have almost superseded imported.

Across the aisle from the exhibit of New South Wales are the light wines of Austria-Hungary; and here also Russia displays the products of her Caspian and Caucasian vineyards. In a far corner of the hall are

the wines of New Mexico, North Carolina, and Japan, in small but tasteful groups. On the pavilion of North Carolina is an inscription which claims that her territory is the home of the grape; thus recalling the stories told by the discoverers of the Atlantic coast as to the profusion of wild grapes along Carolina shores. The Japanese booth has corner posts of bamboo poles, and above it is the national flag, whose device is a red ball upon a white background. The names upon the bottles are strange, and we wonder, for instance, what such a wine as selijyunbudosyu can be, hoping that the beverage is more palatable than its name suggests.



INTERIOR OF THE GERMAN WINE CELLAR

In the gallery of the viticultural section are the government exhibits of Italy, Greece, and Portugal, with miscellaneous assortments from France and Spain. The latter include the cordials of a Spanish manufacturer, of which, it is said, the Infanta loves to partake. On the opposite side of the gallery is the Portuguese collection, contained in a pavilion of which one of the arches spans the stairway leading to the upper floor. Vines are trellised over the wood-work, and the national flag and royal coat of arms are grouped over the principal arch. Within are said to be the genuine wines of the Oporto district. Italy occupies the western end of the viticultural gallery, her exhibit consisting mainly of ornamental structures, composed of casks and bottles, the centre-piece resembling a large flowering bush. Near the base of the structures are many large diplomas presented to Italian wine-makers at former expositions. Of the wines themselves the choicest are those from vineyards planted on the seaward slopes of Mount Vesuvius. The wines and brandies of Greece are displayed in a white pavilion, the roof of which is supported by Corinthian pillars, and at the further end of this gallery are exhibits of California raisins, one in the form of a pyramid of glass cases from Escondido, and others neatly arranged by Fresno dealers and packers.



PART OF GERMAN WINE EXHIBIT

The pomological exhibits are mainly grouped along the curtains of Horticultural hall, and largely consist of the green products of the United States, and other lands. Shipping their fruits in compartments cooled by refrigeration, such distant regions as the Cape and Australian colonies forwarded their more hardy species in fresh condition, while grapes and orchard fruits of the season of 1892 were preserved in cold storage for exhibition, not only in our own but in foreign countries. Thus France has sent us several hundred varieties of deciduous fruits, her display of pears being the largest, and one of the best on exposition. Russia has forwarded a collection gathered from every region of the empire, even from the frozen plains of Siberia, while from the tropics came varieties that could not elsewhere be seen. From northern Africa came a consignment, and New South Wales installed



IN THE FRENCH SECTION

the first shipment of fresh fruit sent from Australia to the United States.

About the middle of March several barrels of apples, a bushel of pears, and a crate of grapes were placed on board a sailing vessel bound from Melbourne to San Francisco, and then forwarded by rail to Chicago, where they were installed in good condition. Other shipments of fruit were made from Australia under more favorable conditions; and by Atlantic steamers, with their cold-storage compartments, oranges, lemons, figs, and other fruits were brought from Naples and elsewhere in southern Europe. Thus the pomological department at Jackson park represents the conditions and products of the principal fruit-growing regions of the world. Several countries which could not furnish a complete exhibit substituted wax and plaster models, Germany excelling all others in this respect, with imitations so perfect that it is almost impossible to detect them. In drawings and paintings are also placed before the visitor the native fruits of several lands.



WINE EXHIBIT CALIFORNIA

A liberal but divided space in the northwestern section of the hall is devoted to the citrus display of California, one that is in all respects worthy of the golden state, collected and grouped with the utmost care, and renewed as occasion requires, the waste of fruit from decay and damage amounting, in this and other exhibits, to hundreds of pounds a day. On tables, in piles, in pyramids, and in more complex forms, one of them reproducing the orthodox liberty bell, are oranges and lemons of all varieties, gathered from many portions of the state, from San Diego county, adjoining the Mexican border, almost to the boundary line of Oregon. Among the scores of specimens are the best that Riverside and other citrus belts could send, including Washington and other navels, Mediterranean sweets, St Michaels, and Malta bloods; while of lemons there are the Sicilian, Lisbon, Bonnie Brae, and Eureka.



REDWOOD TANK

At the opposite end of the section the citrus belt of southern California is represented by a tower of oranges, thirty feet high, its base of navels and other of the larger species, above which are the smaller varieties, its top surmounted by an eagle, and encircled with rows of lemons fashioned in the shape of a cornice. In the open court beyond are orange and lemon groves in miniature, with other exhibits illustrating California methods and products by practical results. Add to this the peaches, nectarines, and apricots; the cherries, and plums; the apples, pears, quinces, grapes, figs, olives, and berries which California had to show during the season of their fruitage, and no wonder that the display from the golden state was to the majority of exposition sight-seers almost in the nature of a revelation.



CALIFORNIA'S TREE PAVILION

Fruit-growing, as I have said, is every year assuming larger proportions in southern and central California, where, from the foothills of the sierra to the shores of the ocean, there are large areas adapted to this industry. Many thousands of acres, before devoted



WINES OF ITALY



WINES OF PORTUGAL

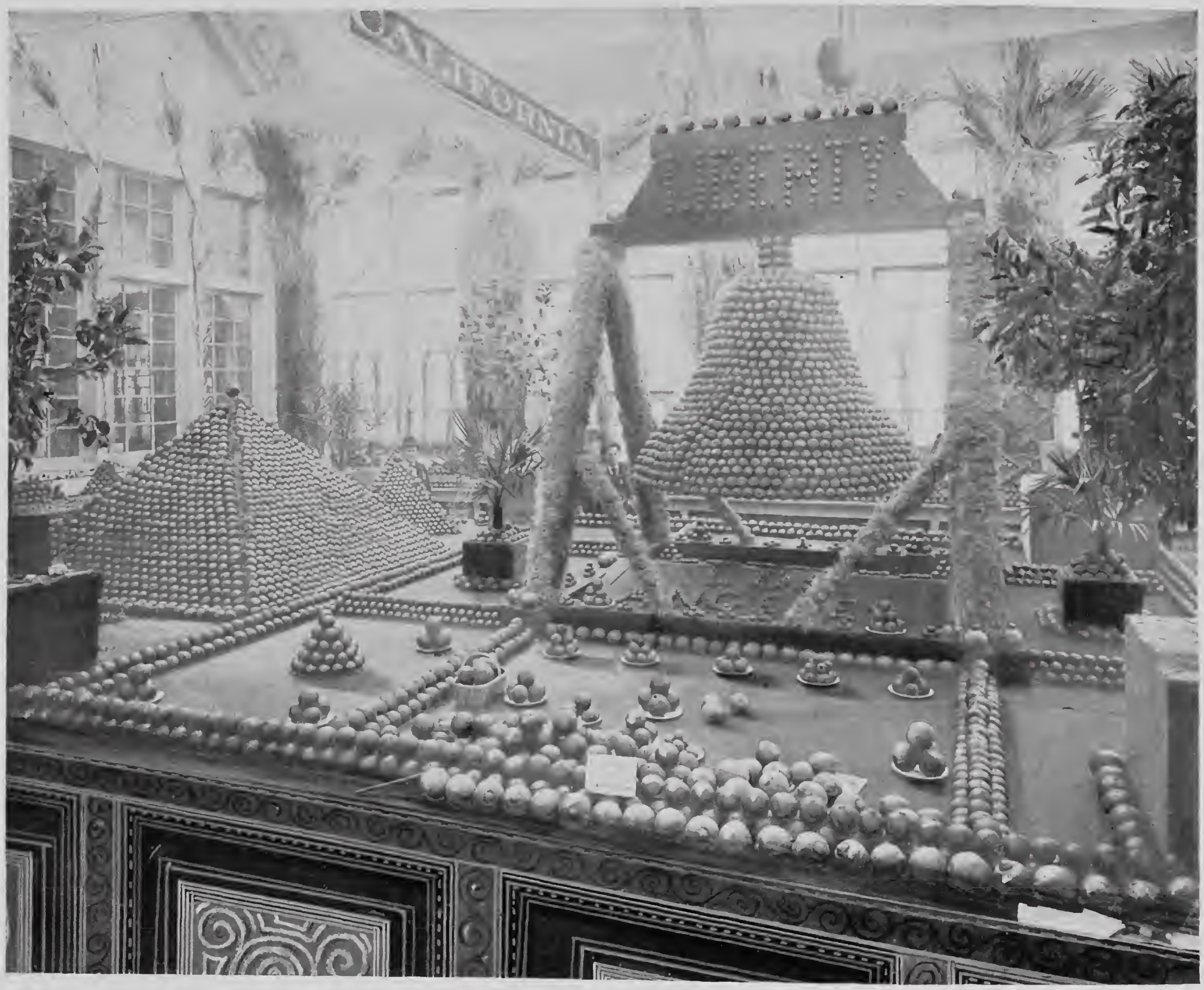
to cereals, are being planted as orchards and vineyards, while in quality, as in quantity, the yield is steadily improving, for inferior fruits are almost unsalable, either in local or other markets. It was not until 1869 that eastward shipments by rail became possible; but since that year, notwithstanding almost prohibitive rates of transportation, the volume of production has increased from thirty to fifty-fold, and with the promise of still more remarkable development, awaiting only the advent of competing railroads. In 1870 less than 1,000 tons of fruit, in whatever form, were forwarded to eastern points; in 1880 the total did not exceed 3,000 tons; for 1890 shipments of fresh fruit amounted to 52,500 tons, and of dried fruit, 33,000 tons. For the three years ending with 1889 the trade with New York alone increased in more than ten-fold ratio; in Chicago almost as much, and in either city California fruits were hawked around their streets, and were for sale at moderate prices in hundreds of stores and booths. Said the New York *Sun:* "The products of Pacific slope orchards and vineyards are now competing with our own fruit products, and beating them out of their boots, so to speak, in spite of the 3,000 miles of disadvantage under which Californians labor in comparison with local growers."

Between the two divisions of the Californian exhibits are scores of long tables covered with groups of apples, including the russet, Ben Davis, Northern Spy, and their kindred, from all the states. New York and Michigan occupy the central spaces, flanked by Wisconsin and New Jersey. "York state" apples have ever been favorites, even with western people, and assuredly her 110 varieties displayed in Horticultural hall will not dispel the charm, especially her Newton pippins and Hudson river apples. Of excellent quality also are her grapes, pears, strawberries, and other fruits, smaller than western descriptions, but, as is claimed, superior as to flavor, texture, and durability, the rich western soil favoring rapid growth and bulk at the expense of finer qualities. Minnesota and Illinois are grouped beyond New York, the latter occupying a tasteful pavilion, divided into sections, in which are displayed her berries arranged according to locality. Iowa also maintains her reputation as a fruit-growing region. Tokay and other grapes, and the large orange cling peaches of the western states are also on exposition, some of the latter almost as large as summer squashes, preserved in liquids, and displayed in glass jars.



LOOKING INTO THE VITICULTURAL HALL

The strongest feature in Missouri's exhibit was her choice collections of peaches, berries, and apples, the famous olden fruit farm of Howell county, and other orchards of the Ozark mountain country sending frequent consignments of peaches in season, while, earlier during the term of the Fair, southern Missouri sent strawberries of wonderful size and flavor. In her exhibition of fresh fruits, replenished and varied throughout the season, Missouri was a competitor with such states as Delaware, New York, New Jersey, Pennsylvania, Ohio, Michigan, Illinois, Wisconsin, Minnesota, and Iowa. There were also 1,000 glass jars of all sizes and shapes, filled with nearly all the fruits, berries, and vegetables of the temperate zone, preserved in antiseptic fluids, so that for several years some of them have almost retained their natural appearance. Arkansas shows many



LIBERTY BELL IN CALIFORNIA SECTION

specimens of apples, pears, peaches, plums, and small fruits, all of excellent quality, and especially her apples, whose flavor and staying qualities are strongly commended.

A theme of almost universal comment are the exhibits of the far western states, apart from that of California. From Colorado come berries as bright and fresh as her own mountain air, with fruits preserved in alcohol, and wax models, taken in fac-simile during the autumn of 1892, of more than 600 specimens of apples, peaches, pears, quinces, and melons. Idaho sends her preserved grapes, prunes, egg-plant, radishes, and other fruits and vegetables, some of which were raised at an elevation of six thousand feet above sea level. Oregon, Washington, and Montana have thousands of green and preserved specimens of apples, apricots, cherries, peaches, pears, plums, prunes, grapes, and berries. The Oregon and Washington booths were somewhat of a surprise; for even among the more intelligent class of visitors, many were not aware that either state could send anything more than samples of their farm products, fish, and lumber. Certain it is that few expected to see here such clusters of Black Hamburg grapes as Oregon sent, some of the bunches weighing nearly a dozen pounds. Her orchard fruits are also of choicest quality, and especially her apples, which, for thirty years or more, have been largely raised for export.

Adjacent to the Oregon pavilion is the Florida section, where he who is so disposed may compare the fruits of the furthest south with those of the far northwest. At the entrance is an archway of russet oranges,

and near by a tall cocoa-nut tree raises its head almost to the ceiling, around its trunk an assortment of nuts, with portions of the shell removed. The walls are lined with gigantic palm fronds, beneath which are rows of cocoa-nuts and pine-apple plants, the latter in all stages of growth and bearing. By Florida were sent the first peaches to the Exposition, with a small collection of early tomatoes, cucumbers, and other fruits and vegetables out of season in the north and west, all the result of private enterprise, for there was no state appropriation for any purpose.

The artificial fruits of Germany are wonderful specimens of artistic manipulation. Crisp lettuces, large apples, somewhat speckled, juicy pears, plums, and berries, parsnips and turnips—cut through here and there to show the interior structure—and other fruits and vegetables are spread before the visitor in such perfect imitation that the closest inspection almost fails to detect them.

Near the California orange tower is a collection of Italian fruits, mainly shipped from Palermo, and opposite is a small display of apples and pears from New South Wales. When their history is known, certain red and yellow apples from the Australian colony attract much attention; for the latter have travelled hither via the Pacific ocean and San Francisco, and the former by way of the Suez canal, the Mediterranean, London, and New York. Both were shipped from the same orchard near Sydney, and those which crossed the Pacific arrived at the Fair two weeks earlier than the consignment forwarded by the Isthmus route.

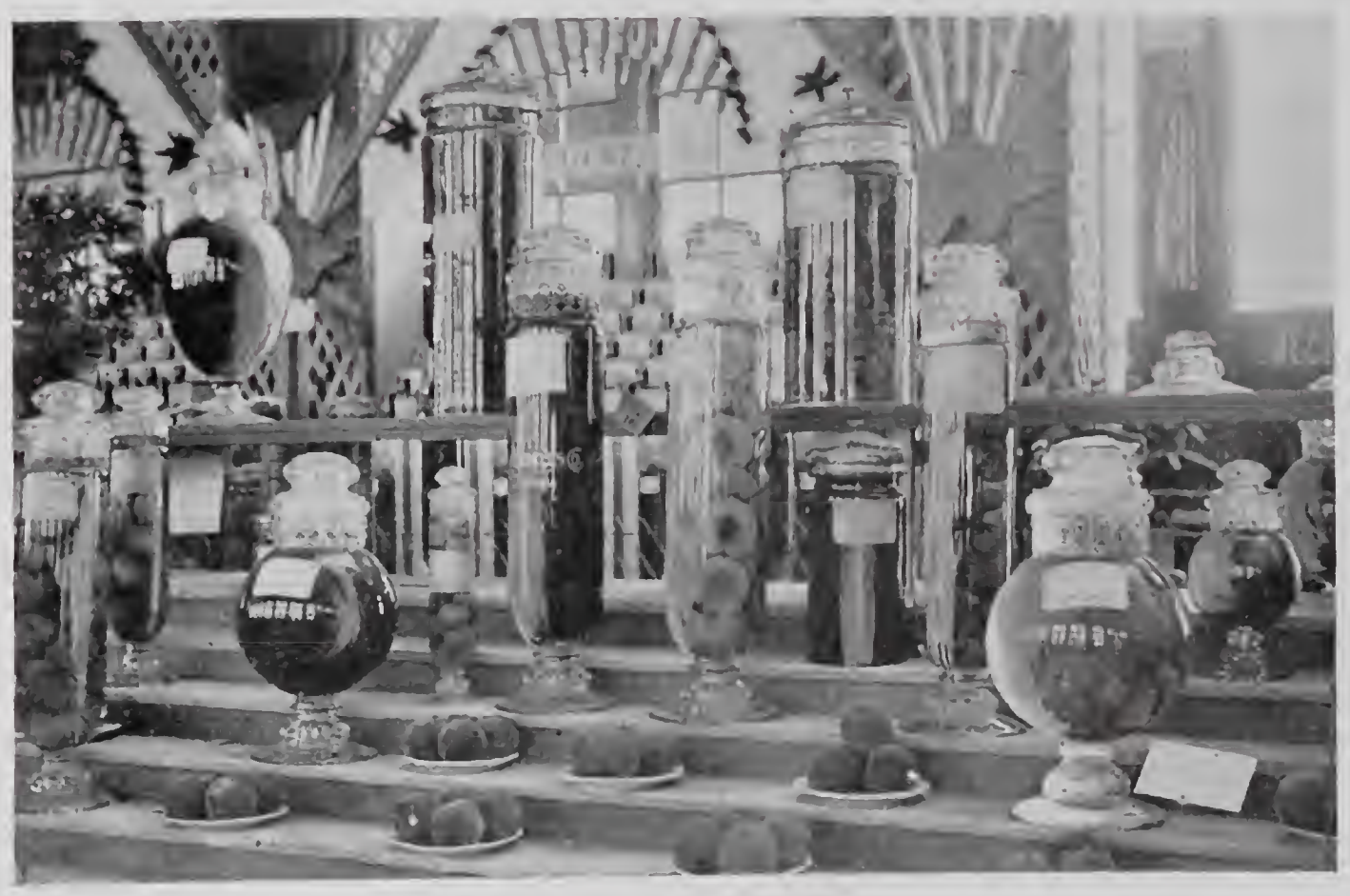


CALIFORNIA CITRUS TOWER

North of the main western portal is the Canadian exhibit, her specimens of berries and other fruits, fresh and preserved, arranged in four pavilions, and on triple rows of tables, the province of Ontario making the largest display. While preserved fruits form the bulk of the collection, the apples, peaches, and berries grown in the garden region enclosed by the great lakes are as fresh as though shipped from Michigan or Wisconsin. Quebec has also a moderate exhibit, and Nova Scotia and Prince Edward's Island prove their capability for producing the finest of fruits. Among the apples from British Columbia are some choice specimens from the orchards of Lord Aberdeen, now governor-general of Canada.



SECTION OF CALIFORNIA EXHIBIT



PRESERVED CALIFORNIA FRUIT



VIEW ACROSS SOUTH CANAL



FRUIT FROM THE FAR WEST

Seeds, vegetables, horticultural implements, dried and canned fruits, nuts, and other articles from the United States and foreign lands are mainly grouped in the northern section of Horticultural hall. In a corner adjoining the display of fresh fruits the New Jersey firm, mentioned as contributing one of the most extensive and attractive exhibits in the floricultural department, erected a miniature fortress of seeds, contained in glass cases, and in thousands of paper envelopes. The summit of the glacis is covered with plume-like grasses, and beyond are rows of vegetables raised from the seed. Canada's space near by presents an unpretentious group of vegetables, fresh and canned, preserved fruits, and pickles. Thence eastward is the German collection of seeds, models of vegetables, garden ornaments, lawn mowers, and all kinds of garden apparatus. Three of the largest Erfurt and Quedlinburgh houses are represented in the hall, and another firm calling itself Purveyor to the Royal Prussian and Ducal Coburgh-Gotha courts makes an extensive exhibit. One of the Erfurt establishments has on the screens of its pavilion a series of paintings symbolic of horticultural pursuits, with tasteful scrolls and cornucopias, gods and goddesses, plump of aspect, and flowers, fruits, and vegetables in every stage of growth.



FRUITS IN SEASON

The New York firm of Henderson and company has a large assortment of seeds, and, in the form of a mound, reproduces in papier maché all kinds of market garden products. On the summit of the mound is a model of its establishment, with workmen at the windows, elevators running to and from the several floors, and customers passing in long procession through the entrance way. Henry A. Dreer of Philadelphia, and J. C. Vaughan of Chicago and New York, have also attractive exhibits of seeds, and there are smaller collections from Ohio, New Jersey, and Utah exhibitors.

Many American, French, and German establishments show, either in the form of illustrations and pamphlets, or as actual exhibits, the latest garden appliances, both for useful and ornamental purposes. There are lawn mowers of regular size and in miniature, motionless, and engaged in cutting imaginary grass from imaginary lawns. Rustic vases, stands, seats, monuments, seals, alligators, and other hideous beasts supposed to add to the attraction of garden landscapes, are also profusely displayed. From Indiana a Bedford firm sends a number of ornamental pieces composed entirely of stone, its works being in the very midst of limestone quarries. Some of the figures are works of art, as those by Leonard Volk, the Chicago sculptor, and the typical gypsy, both of which are on the roof of the pavilion. Adjoining this another Indiana firm has samples of wire net-work for fences and gates. Its pavilion is of wire, the square open-work pillars trellised with vines, and within the enclosure are piles of manufactured articles.



ILLINOIS PAVILION

The French exhibit in this connection, occupying a narrow strip along the northern wall, consists largely of literature devoted to the subject, with the advertisements of houses which furnish fancy baskets, seeds, twine, and all kinds of apparatus for heating conservatories, and hot-houses. A Troyes firm has a collection of knives, shears, and pruning hooks, some of them in fantastic shapes, and suggestive rather of surgical instruments than the purposes for which they were fashioned.

A liberal space in this vicinity is occupied by California products, displayed in the form of pavilions fashioned entirely of canned fruits, towers of almonds and walnuts, and tier upon tier of boxes filled with



A TYPICAL SEED EXHIBIT

prunes and raisins, the last representing an industry whose growth may be inferred from the increase of pack, from 6,000 boxes in 1873 to more than 1,000,000 boxes in 1893. Of excellent quality are the prunes, and other dried fruits of Idaho, and the preserved fruits, jellies, and pickles of Kansas, and Colorado. Even the New Mexican Pueblos, the oldest of our native races, were imbued with the spirit of the day, erecting a little booth across which are printed words of greeting, and placing therein bottles and jars of preserved fruits.

New Mexico has also sent us as a work of art, a reproduction of the Horticultural building itself, in the shape of a model in silver filigree, more than 100 pounds of metal being used in its construction. In this connection may be mentioned another exhibition of fine metal and filigree work, a case filled with wreaths and flowers, closely resembling imitations in wax, displaying the skill of a German artisan. The Greek pavilion lies opposite the one which contains the products of Ohio cider presses. Its contents consist mainly of the figs of Attica, the Corinthian grape or currant, and other dried fruits from mainland and Peleponnese.



NEW YORK DISPLAY

Among the gallery exhibits may first of all be mentioned a tower constructed of cases of English walnuts, forming a portion of the California collections; but here also are booths filled with the canned and dried fruits of many climes. A considerable space is occupied by the San Francisco firm of Lusk and company, in whose pavilion, tastefully decorated with silken banners, are displayed all the canned fruits of the golden state. In a corner of the gallery is shown a very simple device, which is interesting many fruit growers, and has been adopted by not a few. It consists of a long rod, with shears, and a canvas tube attached, so that by merely pulling a cord the stem of an apple or orange is cut, and the fruit falls into the receptacle placed beneath.



THE OREGON SECTION

Pecans, neatly packed in cases, with photographs of Pecan bayou, as well as of the Swinden pecan orchards at Brownwood, call attention to a prominent Texan industry. Among other illustrations, scattered throughout the gallery is one of a special train of canned fruit shipped from San José, California, and elsewhere are views of the public gardens of Bremen, and the villas of Nice. Except for its well appointed restaurants, these almost complete the contents of the gallery, or such, at least, as here need special mention.

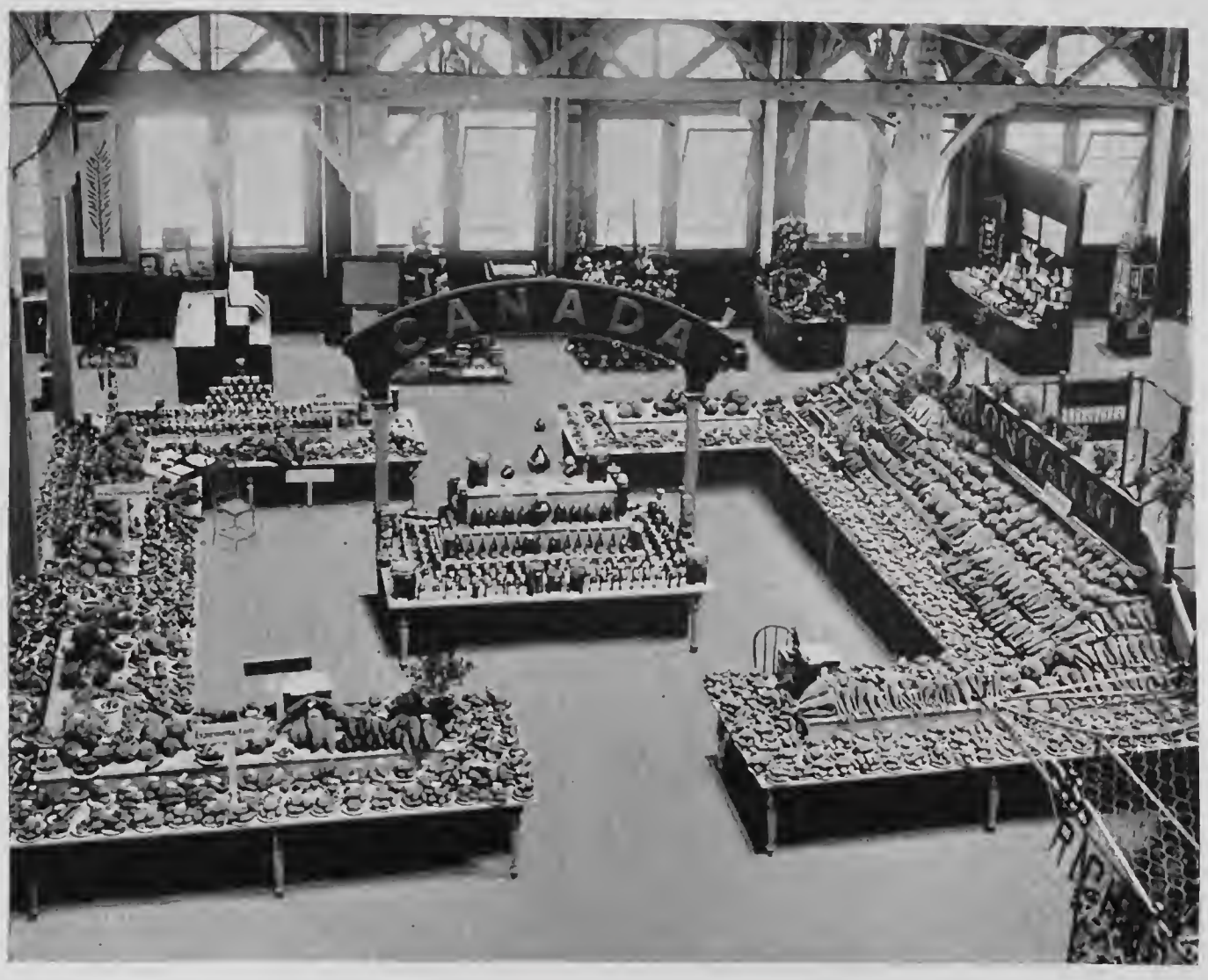
Thus, as briefly as the nature of my subject would permit, I have described the more salient and many of the minor features in the department of Horticulture, an attractive display

to all classes of visitors, and to many the most attractive in all the wide grounds of Jackson park. For the skilful grouping and management of all these varied and varying collections, credit is due, among others, to the chief of the department, John M. Samuels, and to John Thorpe, Charles Wright, and H. M. La Rue, superintendents, in the order named, of the bureaus of floriculture, pomology, and viticulture.



H. M. LA RUE

In conclusion a brief description may be added as to the out-door exhibits in connection with this department, its conservatories, hot-houses, and grounds, with some further mention of the thousands of horticultural and other specimens, contributed in lavish profusion from every quarter of the world. During the autumn of 1892, palms, ferns, nursery trees, and decorative and aquatic plants arrived by the car-load from the United States, from Spanish-American countries, from Europe, Australia, and Japan, until winter put a stop to further shipments. Almost before the snows had melted, the greenhouses near the Horticultural building presented signs of life, and by the middle of April at least 200,000 plants had been received at the conservatories.



CANADIAN VEGETABLES

In early winter thousands of Chinese primroses, hanging in dainty groups of variegated pink, white, blue, and red, represented the floral contributions of England, Germany, America, France, and Italy. Then came the Persian violets, richer even than the Chinese blossoms, issuing in regal splendor from the enfolding bulb. During the lenten season, the cineraria came forth in innumerable clusters, ranging in color from the purest white to the deepest purple. Crimson, yellow, bronze, and lavender calceolaria also revealed their beauties under the feeble rays of the sun, side by side with the English primrose, and the German hyacinth. Japanese ferns, trained in grotesque imitations of beast and fish, European pansies, and geraniums of many varieties helped to complete the opening chapter in the horticultural annals of the Exposition.

During the later spring, large beds of pansies skirted the Horticultural hall, and blossoms by hundreds of thousands were massed between it and the banks of the lagoon. Here were contributions not only from New York, Pennsylvania, New Jersey, and other states, but from Germany, Great Britain, France, Italy, and Belgium. Begonias, cannas, zinnias, and phlox flashed their bright hues around the building, these and other floral displays giving color to the home of the Fair.



CANADIAN FRUITS



CHARLES WRIGHT

In truth there was barely a week, between the months of May and October, that failed to reveal a fresh series of flowers and blossoms, rhododendrons, hyacinths, primroses, tulips, and pansies in May; roses and lilies in June; sweet peas, peonies, tea roses, clematis, and begonias in July; hollyhocks, carnations, dahlias, asters,

verbenas, hydrangeas in August and September; and chrysanthemums, orchids, and various flowering annuals later in the season. The grounds adjacent to the hall, the banks of the lagoon, and the Wooded island opposite, were mainly selected for the out-door display of flowers, which was not only the herald of the Fair but continued throughout its term. The competitive exhibit of cannas, in which New York and Pennsylvania were rivals, was the finest ever witnessed in the United States, including more than 5,000 plants, though Pennsylvania restricted her collection entirely to French varieties.

The neighboring grounds, surrounding the Woman's building, were lavishly but tastefully decorated by France, and here was well represented the floricultural art of this nation of artists, fostered, as it is, by the Jardin des Plants and the gardens of the Tuilleries, the Luxembourg, and the Museum.

But it was upon the Wooded island that the richest of the floral exhibits were concentrated. Here is a resting place, with winding walks, shady nooks, and picturesque summer houses covered with vines, with shrubbery and flower-beds at every turn, and with willows drooping gracefully toward the waters, above which sea-gulls, and other aquatic birds are flitting to and fro. Three bridges of the Venetian order connect with the



JAPANESE EXHIBIT

terraces fronting the Horticultural building, and with the southern shore of the lagoon. One of them, of Japanese design, leads from the mainland to a quaint structure at the northern extremity of the island. Here many visitors linger before this so-called temple of Hōōdo, or wander through a garden laid out with rare ingenuity. Here was the weird looking, long-petalled chrysanthemum, the national flower of Japan, and here bloomed the fragrant rose which the Japanese call wichuriana, before a stranger to this country. In this locality, more than in any other, the visitor was introduced to new and unusual forms of floral life.

The Wooded island was the special home of the rose; at its southern extremity was a gorgeous bed of



JOHN THORPE AND HIS FLOWERS



INTERIOR OF CONSERVATORY



FORESTRY BUILDING

these flowers more than an acre in extent, and near by blossomed fields of rhododendrons and lilies from Belgium, Holland, Great Britain, and the United States. The rhododendrons contributed by the Horticultural society of Ghent were remarkably beautiful, fully maintaining the reputation of that city as a floricultural centre. The roses came from almost every country in the world, forming the most complete collection ever gathered together, while honeysuckles and other vines were trained over the surrounding fences, appearing like solid masses of blossoms and foliage. Germany covered half an acre with her cheerful garden flowers. The holly trees and yews of England were not far away; and Pennsylvania and New York, California, France, and Austria, planted specimens from their fields and forests on this cosmopolitan island. But there was also a distinctly American exhibit, in the form of a magnificent bed of sunflowers on the highest point of the island, their hardy faces hanging in clusters of thousands, and dispensing afar their homely fragrance.

He who is so disposed may wander over the bridge connecting, toward the south, with a smaller island, and there for a moment linger over the picturesque reproduction of an American hunter's camp, and the diminutive bark cabin of an Australian pioneer. The former is the headquarters of the Boone and Crockett club, an organization of prominent sportsmen throughout the United States, whose object is to preserve the large game of the country, especially that of the Yellowstone or National park. The structure is built of rough logs, and within, over the rude fire-



COLONNADE OF FORESTRY BUILDING



THE SOUTH FRONT

place, is the skull of a grizzly bear. On the floor are deer skins, and over the doorway are the broad, spreading antlers of an elk. Woolen blankets, skins, saddles, and lassos are strewn carelessly over rude tables, bunks, and chairs; field glasses and weapons lean against the rough walls, or are fastened to them; a pile of fuel is neatly stacked in a corner of the room; in short, there is nothing omitted from the furniture and equipments of a hunter's cabin. The camp is under charge of Elwood Hofer, who, for the occasion, was relieved from his task of capturing animals in the Yellowstone, or National park, for the Smithsonian institution.



INTERIOR VIEW

Though officially classed with Agriculture, the Forestry exhibits will here be described in connection with Horticulture, to which department they would appear to be more akin. Though foreign lands are also represented, the specimens are gathered mainly from the United States, whose forests, as it would seem, are not destined to remain much longer on the face of earth, for apart from other uses, some 40,000,000,000 cubic feet are annually converted into lumber, representing an industry which keeps busy about 100,000 establishments and several hundred thousand men, with a value estimated at $800,000,000 a year.

Of all the Exposition structures the Forestry building is, more than any other, symbolical of the purposes for which it was designed, forming, as it does, an integral portion, and perhaps the most interesting portion of the exhibits which it contains. A plain, unpretentious edifice, 500 by 200 feet, and with its main façade fronting on the lake, in style of architecture it is of the rustic order, its roof thatched with bark, its sides of wooden slabs from which the bark has been removed, and its entrances fashioned in various kinds of wood.



MICHIGAN BURLS



SPECIMEN DISKS



LOG FIREPLACE, MICHIGAN EXHIBIT

But the most unique and attractive feature in this temple of Forestry is the colonnade which supports the roof of the spacious veranda, formed of the trunks of trees twenty-five feet in height, but otherwise of different proportions, arranged in groups of three, and with the largest of each triplet in the centre. About thirty states are here represented, and the flags and coats of arms of participating nations and commonwealths appear above the cornices of the veranda. A passing examination of these columnar trunks shows that the larger specimens are of red cedar, Douglas fir, bull and white pine, western hemlock, the black spruce, the bald cypress, the tulip poplar, the white oak, and the green ash. The principal minor specimens are the Ohio buckeye, the Sitka spruce, the western larch, the red alder, the arbor vitæ, red oaks, aspens, and yellow and white birches. Here are represented the forests of Canada, of the east, the south, the Pacific slope with its far northwest, including all the wooded regions from the Arctic ocean to the gulf of Mexico.

Among the most beautiful of the columns which flank the great trees are the silver maples which once grew on the banks of western rivers, or on the Atlantic coast from Maine to Georgia, and the red maples of the swamps, which still are found at intervals from Canada to the gulf. More delicate still are the birches, with bark of pure white or silver yellow. The strips which hang from the trunks seem as if covered with rime, for the birch is essentially a tree of the north. Carrying out the idea of displaying the primary forms of forest wealth in the structure of the building, its sides are composed of slabs, the frames of doors and windows being sections of logs with the bark removed. From the roofs of the verandas depend borders, or cornices, fashioned from limbs and saplings into simple geometric figures. Bark covers the roofs of both verandas and main structure, a rustic fence surrounding the latter. In the erection of the building wooden pins were substituted for nails and iron bolts, for the design of the architect, Charles B. Atwood, was to illustrate the substantial and economical work which can be done by American builders with wood alone. In carrying out this idea, and in making the building itself the primary exhibit of the department, about $100,000 was expended, and more than 2,500,000 feet of timber were consumed.



WOODEN MANUFACTURES



SAMPLES FROM MISSOURI



SECTION OF CALIFORNIA TREE



VIEW OF CALIFORNIA EXHIBIT

A superficial examination of the Forestry building fails to disclose any main portal, for all the doors are square, and of similar pattern. Once within, however, the visitor soon discovers a spacious vestibule fronting the east, which may be considered as the principal entrance. Here is an illustration of the decorative qualities of yellow pine and cypress from the Southern Lumber Manufacturers' association, the sections of wood forming the square pillars and panels of the dado, the round columns above, the rich border of cypress, and the ceilings themselves, being highly polished, and dressed so as to show all the details of graining.

Passing thence, the visitor finds most of the massive exhibits fronting the vestibule, or grouped in its neighborhood. Around him are the products of the forests of Michigan, Wisconsin, Washington, West Virginia, North Carolina, and Missouri, and before him gigantic sections of pine and hemlock from Canada, and slabs of polished woods from the wilds of Australia, while in the very centre of the hall is a massive monument containing specimens from all the exhibiting states and countries. Scores of huge blocks and polished sections of wood are arranged around the mammoth redwood from California, which has carried away the honors of the entire display, an arrow and the head of a brass tack upon its face indicating the diameter of the tree at the time of the event which the Exposition celebrates. Another object which attracts almost as much attention is one of the axes which England's premier uses so vigorously upon the trees of his Hawaarden estate.

To the northeast of the vestibule are the evidences of Michigan's forest wealth. A rustic gateway gives entrance to the exhibit, the cabinet which incloses it being highly polished, and neatly panelled bird's eye maple, oak, elm, walnut, and other varieties entering into its construction. An odd conceit, and one deftly executed, is that of placing



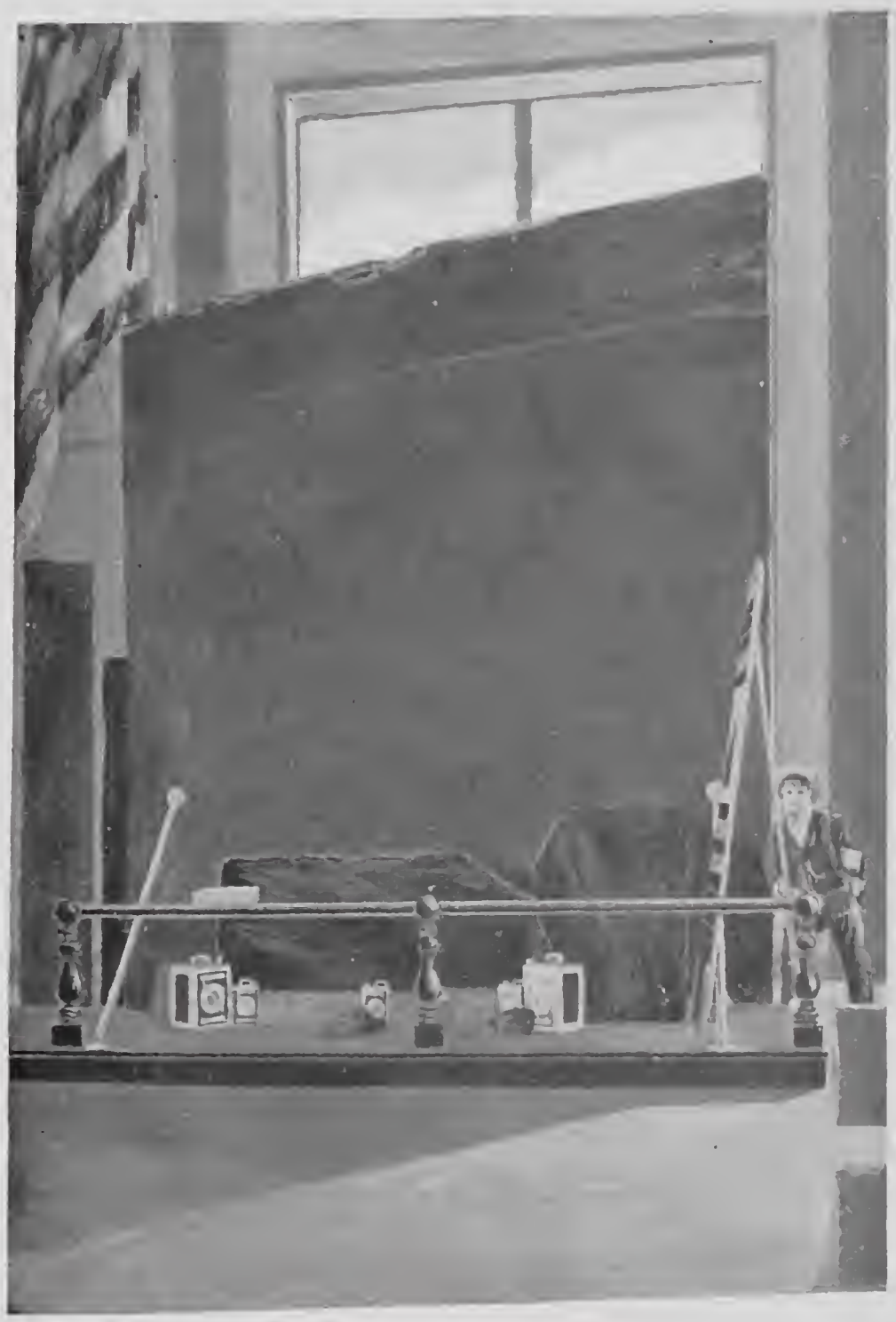
SETTEE IN NORTH CAROLINA SECTION



IDAHO'S PINE



LUMBERING TOOLS



RED WOOD PLANK FROM CALIFORNIA

in the cornices several transverse sections of small logs, with the bark only removed, hatchets, saws, and compasses carved out of wood appearing at various points, and completing the decorative scheme. Over the main entrance is the symbol of the state, two stags engaged in combat with an eagle between them, and specimens of pine, cedar, and poplar are contributed by her experiment station. The furniture factories of Grand Rapids and other cities of southern Michigan find in the specimens of walnut, oak, maple, and pine here displayed, one of the secrets of their success. In a small photograph gallery within the pavilion are shown the enemies of Michigan woods, one view depicting the ravages of the web-worm upon the poplars of a city avenue, every leaf being stripped from the branches, while upon the opposite side of the street is a row of flourishing maples exempt from the plague. In a corner of this section is a rough fireplace made of logs, and in the centre a miniature fortress of gnarled trees. Various forms of manufacture are also represented, as sulphite fibre, basket-work, and wooden-ware.

Wisconsin has erected a neat pavilion built of her native woods, with six varieties in each of the twenty hexagonal columns which support the birch bark roof. The floor is of cherry and birch planks, and between the pillars are two-score blocks of timber which have a commercial value. In the centre of the structure are logs of pine, oak, and other varieties, with smaller sections arranged on stands. In branches and seeds are also represented the pine, spruce, birch, and hemlock forests of northern Wisconsin, as well as the cultivated elms and other ornamental trees of the southern portion of the state. Upon the walls and scattered throughout the specimens are many colored pictures and photographs depicting scenes in logging camps, saw and lumber mills, showing some of the largest loads of logs which have ever been hauled from western forests, one of them twenty-one feet high and twenty in width.

A score of people might stand on one of the mammoth disks of cedar which Washington has laid upon the floor; and this is by no means the best that the forests of the evergreen state can do, though here as in her own building is an imposing display. Missouri woods include many varieties, with rough sections of trees and others dressed and polished, among which may be noticed the delicate graining and tinting of the holly, aspen, yellow cypress, and silver maple. This exhibit is inclosed by a wall of tree trunks cut in regulation lengths, including about 150 massive specimens.

In an adjoining section, the forests of West Virginia are displayed in a collection of photographs. Forests of pine, spruce, chestnut, beech, oak, cherry, and black gum, and logging scenes in the mountains, and along the rivers, are all represented by the artist, and there is a circular tower of woods with gigantic poplars and tulips at the base. A lumber company shows hardwood capable of taking a beautiful finish; a Parkersburg mill company has an exhibit of brush handles and wainscoting, and the Standard Oil company one of the barrels used in its export business.

North Carolina has an extensive and varied display, rugged specimens and photographs of timber trees conveying an excellent idea of her forest growth. Here also is a large display of nuts, seeds, cones, and bark, and a small collection of balsam, turpentine,



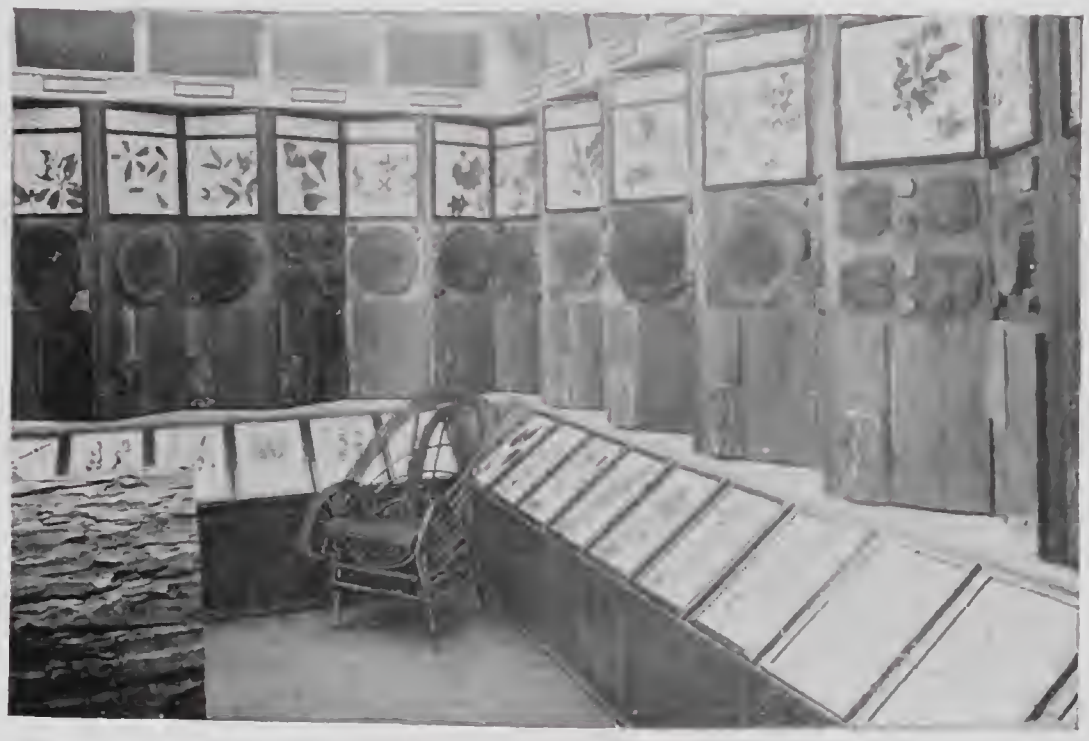
HOUSEHOLD WOODENWARE

and other products of the pine, for which the state is noted. The exhibit is arranged in a series of cabinets, the bases of which are composed of native woods, and the upper portions of large photographs of the forests from which they were cut, some of them 7,000 feet above the level of the sea. A valuable feature in this section is the views which illustrate the results of scientific forestry, as conducted on the Asheville estate of George W. Vanderbilt. In one of the corners is the graceful form of the palmetto tree, the symbol of the sister state, which is not represented in this section of the Fair.



CORNER OF MINNESOTA SECTION

Among the many interesting groups lying south of the main vestibule are the Jesup collection of American woods, and the exhibits of California and New York. The Jesup collection is a duplication of the cabinet in the New York museum of natural history, similar in scope to the display of native woods in the Government building. Each of the 430 specimens is labelled with an outline map, showing the area in which the tree is indigenous, together with a description of its characteristics. Here, for instance, one learns that the hemlock belt ranges from an altitude of 2,700 feet in British Columbia to 10,000 feet in the sierra of central California; that the Douglas fir grows from 200 to 300 feet in height, and that it is the most generally distributed timber tree of the Pacific coast; that the arbor vitae flourishes best in the swamps of the north, and that the cottonwood on the banks of the Ohio river, and that the balm of Gilead species has as its territory Canada, the United States westward to Colorado, and the entire northwest as far as the Arctic ocean.



INTERIOR OF OHIO PAVILION



WALNUT LOG FROM KANSAS

In the adjacent exhibit of California the redwood, laurel, walnut, maple, elm, locust, madrona, and the so-called big trees stand row by row like gigantic sentinels, their faces polished, and displaying all the beauties that timber can be made to assume. To many visitors these are somewhat of a revelation, for here were for the first time shown to them the excellencies of California woods for cabinet and ornamental purposes. Here also are festoons of cones, burls of curious shape, and an unadorned section of a redwood that might serve for an ordinary table.

The New York state exhibit, which occupies a large space in the eastern portion of the hall, presents a striking illustration of the forest growth of the empire state. In revolving frames are thin sections of her trees, with their seeds, bark, and leaves, and within each frame are photographs, one showing the tree from which the

different parts were taken, and another a portion of the trunk. Among the collection are such varieties as the Norway pine, the English cherry, hickory, spruce, balsam, balm of Gilead, fir, tamarack, larch, hawthorn, cedar, sycamore, black walnut, poplar, hackberry, birch, elm, ash, maple, and chestnut. Many of these are also reproduced in photographs, together with landscape scenes adjacent. Another feature in the New York exhibit is that which shows the texture of different woods, and different portions of the same wood. Sometimes the specimens do not exceed the twelve-hundredth part of an inch, and when placed against the light, not only show forms of geometric combination but reflect colors of exquisite tint. When examined under a microscope even greater wonders are revealed.



CANADIAN EXHIBIT

In the southern section of the hall Connecticut has a rustic booth of cherry wood, its specimens of burl oak, walnut, pine, ash, hickory, etc., in sections of which one side is polished, and with seeds, foliage, and twigs as adjuncts of the display. No less artistic is the exhibit of Massachusetts, both of them demonstrating that while eastern woods are of smaller size, the grain is finer, and the timber more durable than in western varieties. A New Jersey firm in this vicinity shows some of the uses of eastern spruce and poplar in a group of tubs, pails, bowls, measures, and pans, pressed from the pulp of these woods, and said to wear like metal, besides being odorless and seamless.



ENTRANCE TO QUEBEC SECTION

In this vicinity Colorado places a giant poplar cut from the first tree planted under her timber culture act of 1877. Great firs, spruces, and other varieties form the corner pillars and base of the booth, while above are the trunks of such trees as the black-thorn, dog-wood, hackberry, wild cherry, black cottonwood, dwarf birch and maple, hazelnut and mountain mahogany, some of them taken from the cañons of the foot-hills, and others from the mountains thousands of feet above. In a series of frames are sprigs from the yellow and fox tail pine, the black birch, red fir, cedar, sage brush, box elder, and quaking aspen; also a row of jars filled with buffalo berries, wild plums, choke cherries, and seeds of





SLABS FROM AUSTRALIAN FORESTS

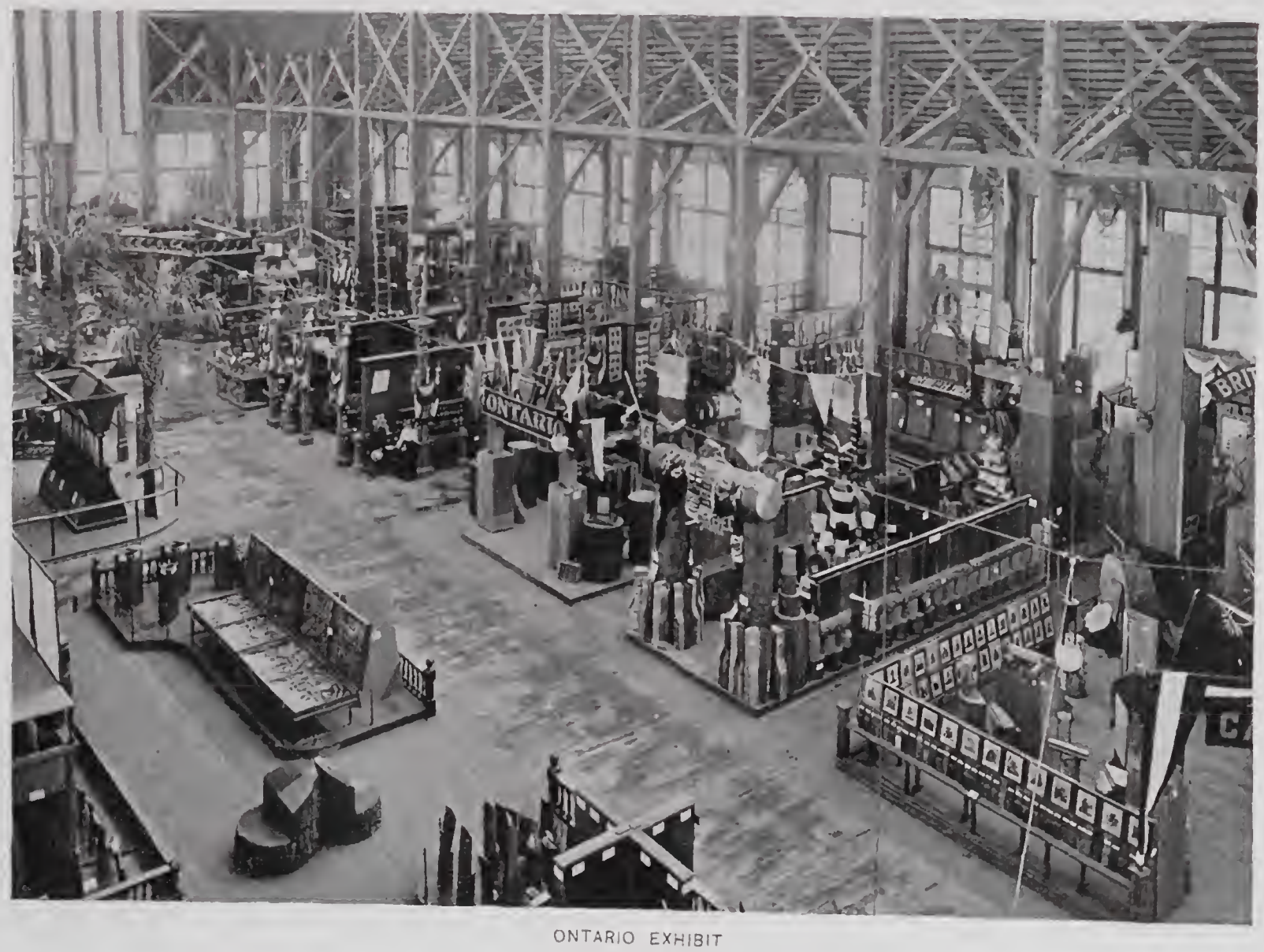
the Douglas fir and balsam. The bulk of the silver state's exhibit comes from her agricultural college.

Close to the Connecticut pavilion are the exhibits of Florida, Arizona, and Idaho, the woods of the peninsula state being mostly furnished by railroad companies. Those of Arizona and Idaho consist mainly of pine, the former state asserting that while she has been called a treeless desert, there are within her domain 2,000,000 acres of pine untouched by the woodman's axe.



ENTRANCE TO ONTARIO PAVILION

In the southern portion of the hall of Forestry are grouped the individual exhibits, one corner being filled by a mammoth redwood wine tank, constructed within the building by a San Francisco firm. Across the way is a pyramid of tubs, pails, and other wooden ware from a Chicago house, and near by is a large assortment of wooden knives, forks, rolling pins, scoops, bowls, and medallions. A pulp and paper company shows in a series of jars, with explanatory labels, the processes through which spruce chips pass, from the crude material to the bleached pulp, and to colored rolls of paper. Not far away are booths in which is shown cork in various devices, some of them approaching the artistic, such as pictures made of the shavings and other fine sections, one of the exhibitors reproducing St Peter's and picturesque scenes on the Rhine, with remarkable fidelity. Among other exhibits are trees in their natural state, and trees of which nothing is left but their outer coverings, or the portions from which the cork is cut. There is cork piled up in slabs like cord wood, and cork tables, towers, and pavilions.



ONTARIO EXHIBIT

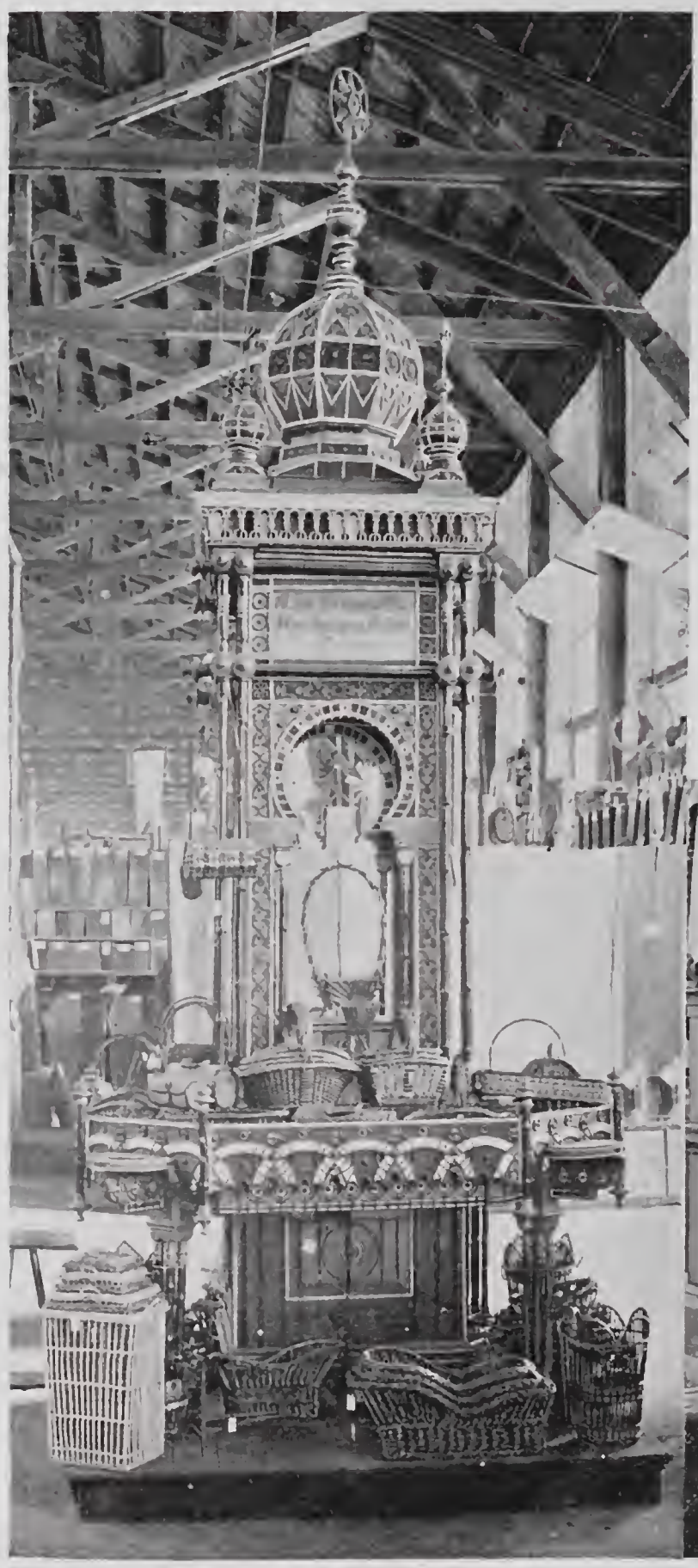
Near these are specimens of wood-turning, in the form of snakes coiled for attack, billiard balls, charms, watch-chains, stair and chair ornaments, flowers, and nearly everything that has been accomplished in the way of decorative wood-turning. A choice and varied display of foreign woods is that of the E. D. Albro company of Cincinnati. Upon a large platform, above which are the flags of many lands, is grouped an array of polished slabs, such as are used in cabinet work. Surrounding the platform are rows of upright posts, cut from valuable timber, as the ebony of Ceylon, the red Brazilian tulip, the

rich brown lignum vitæ, the fine grained and yellowish shittim from Palestine, and the Amazonian cocobola, rosy red, and with patches of gold near the bark. Piled high upon the platform are slabs of mottled brown Persian walnut, yellow Brazilian satin-wood, the Turkish ash, and the white mahogany of Mexico with its delicate cream color. Near by is a collection of implements, such as are used in lumber regions, and adjacent to these a group of household appliances in structural form, manufactured from the aromatic cedar of Virginian forests. A Detroit firm displays a large plank from a California redwood, with the oil finish of which it makes a specialty. A Chicago establishment has a pavilion composed of many varieties of wood, in the finishing of which its varnishes are used, and a manufacturer of wooden faucets, saturated with india rubber, has a structure built of bark, with arched doorway whose keystone is of cork.

The northeastern quarter of the Forestry building contains, in addition to the exhibits already described, those of Pennsylvania, Ohio, Wisconsin, Minnesota, Nebraska, North Dakota, Oregon, Virginia, Louisiana, and Kentucky. The display of Louisiana, whose forests are yet almost untouched, forcibly illustrates one of the great resources of the southern states. The pavilion is of cypress, pine, oak, ash, and other native woods, surmounted with a cupola, and with pillars and ceiling handsomely carved and inlaid. In the decorative scheme are reproduced the leaves, flowers, and branches of Louisiana trees, and within are represented in various forms her sturdy oaks, her lofty pines, her graceful willows, her rapid-growing chinas, and stately beeches and ash, with the creamy-blossomed magnolia, the fan-like palmetto, the wide-spreading elm, the moss-hung cypress, and the odorous cedar. Some of the specimens are in the form of large square blocks, one side retaining the bark, and the other showing the wood stripped of its outer covering, with samples of hewn timber, such as reveal the beauties of the polished surface. Upon the blocks are partially manufactured articles, illustrating the uses, commercial and ornamental, to which the wood may be put. An interesting series of maps and charts explains how the timber is cut and floated along an intricate system of bayous to the saw-mills on the Mississippi.



DOUGLAS PINE FROM BRITISH COLUMBIA



WILLOW WARE IN GERMAN SECTION



FRENCH WILLOW BASKETS



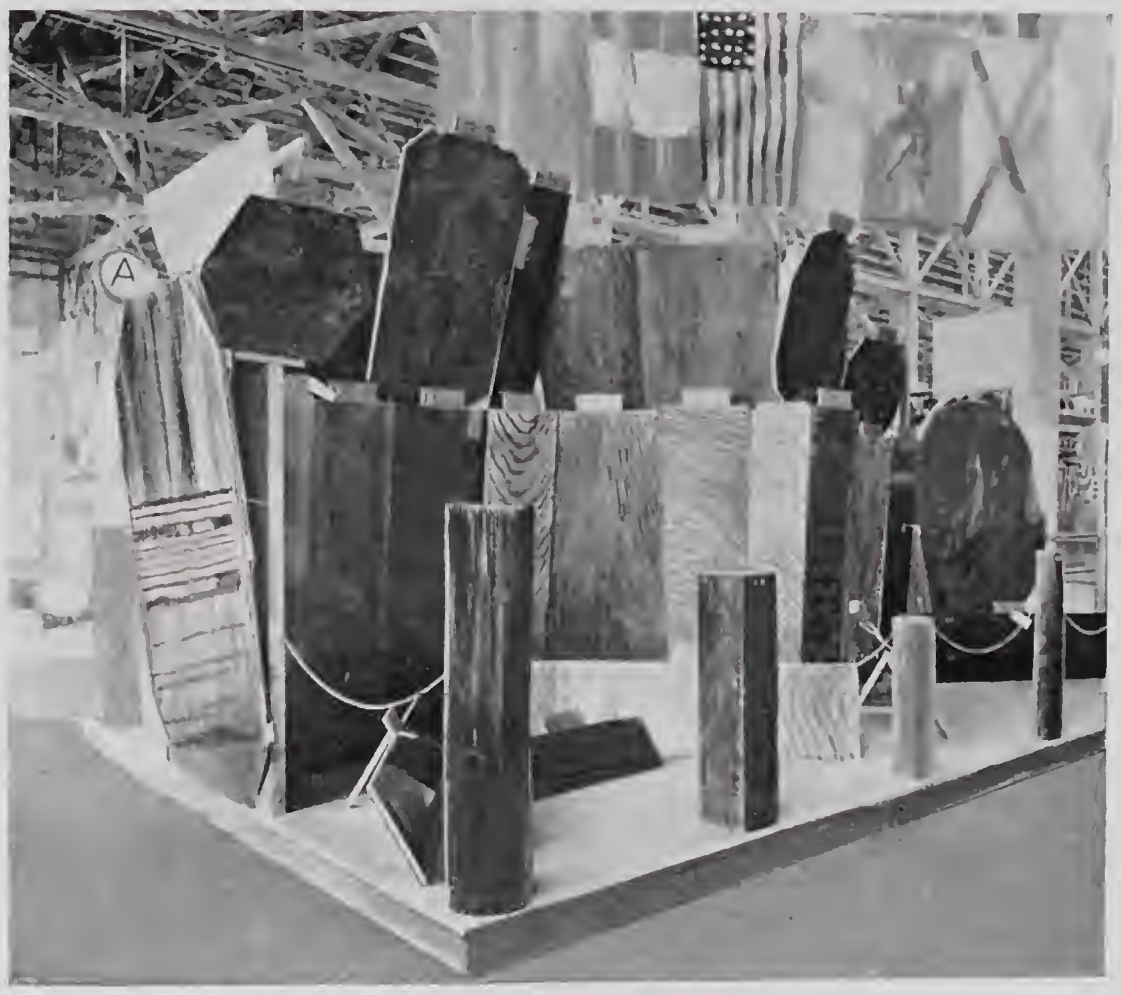
THE ADMINISTRATION PLAZA



INTERIOR MEXICAN PAVILION

Virginia has but a scant display of forest woods, while Kentucky is somewhat of a surprise. The entrance to the latter section is through a hollow segment of a sycamore tree, sixteen feet in diameter, which grew in the neighborhood of Fairview, the birthplace of Jefferson Davis. To the right is a huge yellow poplar; to the left a great white oak, and in a series of pyramids are native woods in 150 varieties, while in a relief map are shown the timber areas, the logging streams, and other matters connected with the lumber interests.

Minnesota has also an interesting exhibit in her rustic pavilion surrounded by a fence upon which are perched in life-like form, birds, gophers, and other specimens of her fauna. The display is of an instructive rather than a massive character, such as might have been expected from her boundless forests, and the numerous industries connected therewith. A few blocks of pine there are, bearing carved stars upon their faces; but elsewhere are only simple specimens of cultivated trees. A section of European larch is shown, which is said to have grown further north than any tree of its kind. A block of Minneapolis cottonwood is historic, for it was hewn from the first tree planted in that city, nearly forty years ago. All the native varieties are on exposition, and among transplanted species are the Russian mulberry, the Lombardy poplar, the Scotch and Austrian pine, the Norway spruce, the diamond willow, and the European larch.



POLISHED FOREIGN WOODS

In connection with the Minnesota display may be mentioned her State Forestry association, by which the exhibit was organized. To this institution credit is due for its efforts in calling attention to the wholesale destruction of forests, and the climatic and other evils resulting therefrom. It has also repeatedly urged upon congress the appointment of a board of forestry commissioners for protective purposes, and to promote the science of arboriculture.

Among the purposes of the Forestry department of the Exposition is to collect information from every quarter as to the amount of valuable standing timber, the effect of forest destruction on climate and soil, and the results which have followed the adoption of various timber culture acts. It is intended to demonstrate the wealth of our forests, ascertain the ratio of consumption and destruction, and the efforts made to counteract this destruction, through the preservation of timber tracts, and the planting of new areas. This is accomplished not only in the exhibits themselves, but in maps, photographs, reports, and literature devoted to the science of forestry. Nebraska and North



OUR SISTER REPUBLIC

Dakota especially demonstrate the benefits of tree-culture, and one of the most prominent objects in the former section is a life-sized portrait of J. Sterling Morton, to whom Arbor day owes its origin, for many years a resident of that state, and now secretary of the national department of agriculture. The Nebraska pavilion is of the rustic order, with a mammoth cottonwood disk at one of the entrances, and on arches and pillars, composed of cottonwood, linden, honey locust, ash, and elm, are sprigs of green grown from the trunks since they were placed in Forestry hall. One of the curiosities here displayed is a horseshoe embedded in the heart of a big cottonwood hung on one of its limbs a dozen years ago, and imprisoned by its growth.

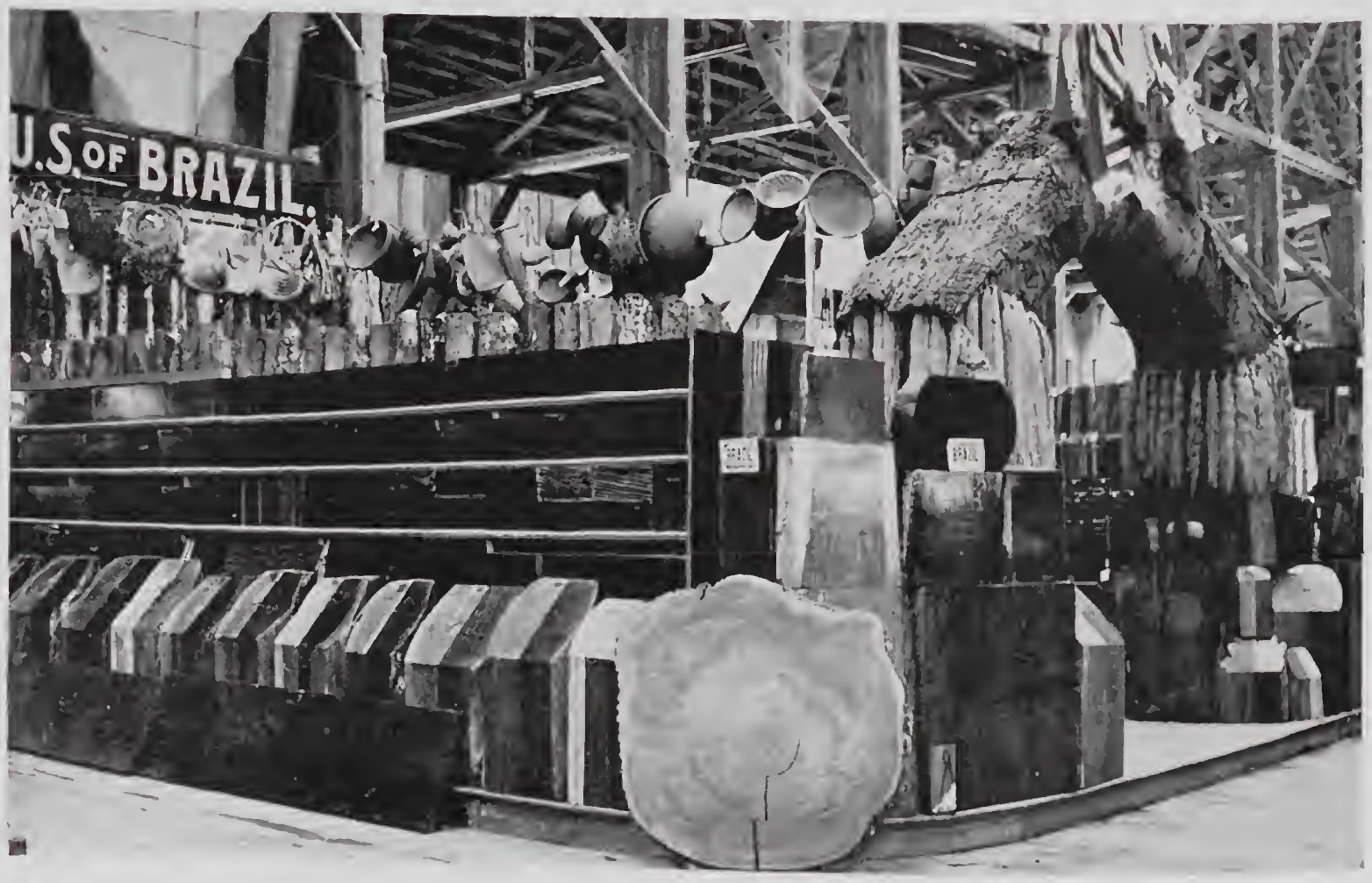


MEXICAN MAHOGANY BLOCK

In the huge logs cut from planted trees exhibited by North Dakota, is shown what may be done in the way of arboriculture on prairie soil. A thick section of bark forms the back of a chair, the body of which is hewn from the trunk, and the various specimens are labelled with the ages of the trees, and the conditions under which they were planted. Near at hand is the square pavilion in which Ohio presents a complete display of medicinal plants, with more than eighty specimens of native forest trees in the form of twigs, leaves, flowers, fruit, and section of trunk and bark, in the rough and polished; the latter profusely illustrating the graining of woods suitable for turning, cabinet work, and interior finish. The walls of this structure are covered on both sides with framed specimens of herbs, bark, twigs, flowers, fruit, and foliage, the pillars forming samples of rough wood, and polished slabs the panels below the cornice.

At the northern end of the Forestry building Pennsylvania shows several hundred varieties of her native woods, together with a model saw-mill, with logs being drawn up its front incline, and in the yards behind piles of finished lumber, while on the roof are rows of water barrels as a safeguard against fire. Into the Oregon booth adjacent, the visitor enters between huge sections of yellow fir and spruce, the latter cut from a tree 305 feet high, and 16 at the base. Within, the commission has a beautifully finished office, the side walls formed of polished planks of fir and spruce, contributed by the lumbering and mill companies of Astoria and Portland.

In the northwestern portion of the Forestry building is a collection of cedar, pine, oak, cherry, cottonwood, and other varieties from the territory of Utah, one that seems out of place, pushed aside, as it is, into a corner among the foreign exhibits; for here is a valuable exposition of what can be done in the way of tree-planting under most adverse conditions, and nowhere has arboriculture been conducted with more of system and success.



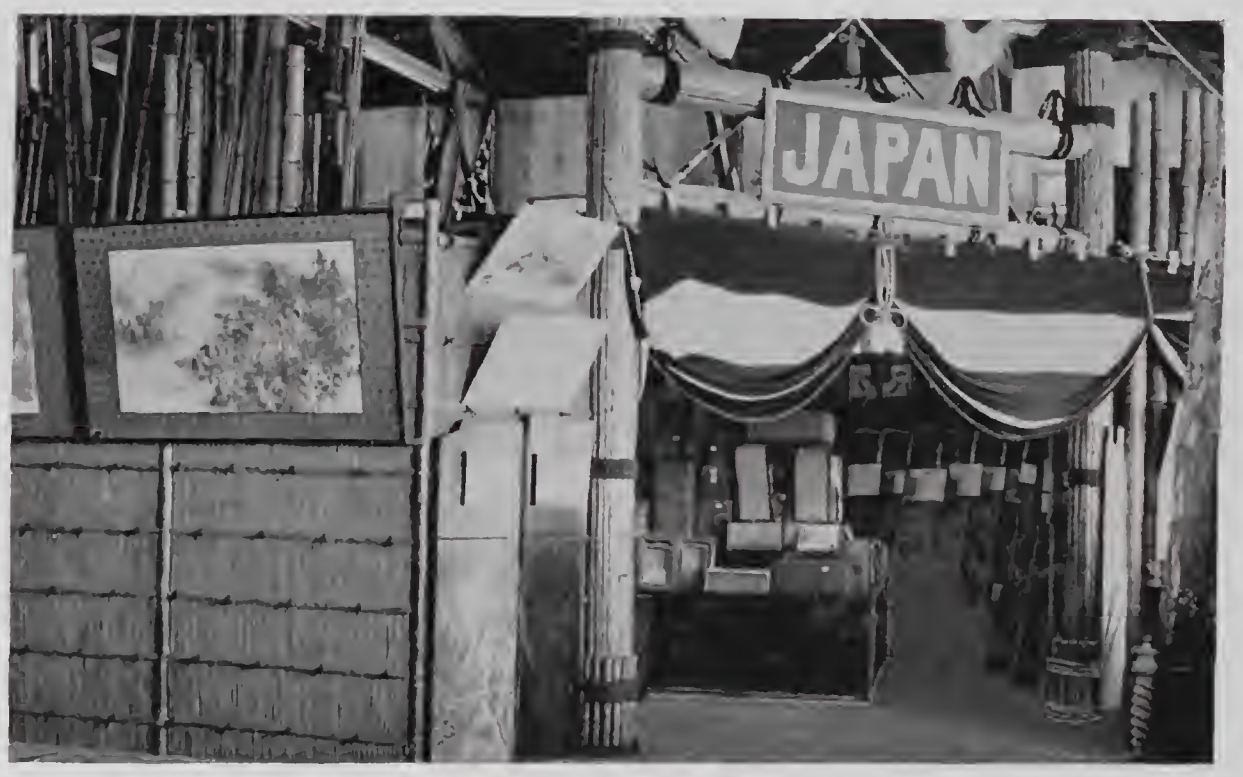
Almost in the centre of the western division of the hall are the exhibits of New South Wales and Canada. In the Australian collection are more than ninety varieties of hardwood, enclosed by upright planks, polished to a distance of six feet from the floor, and forming an excellent sample of antipodean workmanship. From the top of the booths float the flags of the Australasian colonies, and above all is an ensign bearing the inscription "Advance Australia," which is seen in many other departments of the Exposition. The outer wall is largely composed of the most valuable of Australian timbers; ironbarks, red, grey, white, and black; gum trees, spotted, grey, blue, red, and white;



JAPANESE SLABS AND FIBROUS WOODS

blackbutt, woollybutt, and tallow wood. Some of them grow to a remarkable height, the blue gum-tree reaching an altitude of more than 300 feet. Piles of monster logs are trimmed to show the fibre of the tree, one of red cedar from New South Wales being nine feet long and six in diameter. There are also slabs of lignum vitæ, river oak, rose-wood, quince, black oak, sassafras, myrtle, and elm, with sprigs, bark and seeds of the same varieties, and in large photographs, hung upon the walls, are depicted the vast forests from which they were taken. Among the most valuable forest trees of New South Wales are the red gum and iron bark, one of the uses of which is illustrated in a large pile of railroad sleepers in the centre of the enclosure. A few feet away is a photographic reproduction of Sydney streets, representing the paving of one of her thoroughfares with pine blocks. Pictures of lumber mills and factories indicate the development of industries whereby the raw material is transformed into primary forms of manufacture.

Massive logs, blocks, and slabs of timber, heaped within and around the areas occupied by Quebec, Ontario, British Columbia and the northwest territory display their wealth of pine, spruce, tamarack, cedar, balsam, birch, ash, maple, cherry, butternut, and other valuable woods. Quebec has a strong exhibit with many materials in the rough, and an exposition of the progressive stages in the manufacture of wood pulp. The entrance to her section is broad and square, composed of untrimmed logs, and a wigwam of bark in the rear is suggestive of the fragrance of her forests. Ontario and British Columbia have each a separate pavilion, the former showing a large picture frame inlaid with native woods, and a model of a church, also designed to display the variety of her forest products. British Columbia, whose pavilion is adorned with the heads of deer, has several of the largest sections of Douglas fir contained in the Forestry building.



ENTRANCE TO JAPAN SECTION

In the French section, adjacent to the Canadian groups, are specimens of cabinet woods, cut veneers, osier work, and mosaics in wood, fashioned and grouped with the skill and taste of the Frenchman. In paintings, photographs, and maps are scenes among the picturesque regions of the French Alps, thickly clad with the pine forests which the government protects with zealous care. There is also an excellent display of conifers, and of such forest products as pitch, tar, and resin.

The German collection is in the northwestern portion of the hall, grouped, for whatever reason, among those of South American nations. This exhibit may be considered as the chief exponent of scientific forestry, as represented at the Fair. In maps are shown the forest distribution in many portions of the empire, the changes in their condition under forest management, during a large number of years, and the temperature of the soil within and without the forests. Instruments are displayed recording the temperature of the soil, and measuring the growth of trees, and there are models of logging railroads and tree-planting tools. In a chart prepared by the royal forest inspector of Bavaria is explained the nature of the soils in his territory, and the experimental station at Munich describes, in an object lesson, the ravages of the



INTERIOR JAPAN SECTION



SIAMESE EXHIBIT

pine moth, while the forestry schools connected with the universities contribute to the interest of the display. There are also specimens of tannin and tannin extracts, basket ware, cork, and that which is made of cork.

Germany may be considered as the mother of scientific forestry among European countries. In the seventeenth century arboriculture was studied by her learned men, and a hundred years later was being systematically taught in her colleges. Meanwhile the movement had spread to Russia and Austria, and later, schools of forestry were also established in France and Spain, where before the application of remedial measures, many of the mountainous and wooded districts, formerly supporting large populations, had become almost deserted. To-day, apart from the United States, the governments of all the leading countries in the world so manage their forest tracts as not only to insure their preservation, but to derive large revenues therefrom. France has 7,500,000 acres of national forest lands, and individuals nearly twice that area. One half of the 20,000,000 acres of Prussian timber lands produces a net annual income of $6,500,000, while Saxony's 400,000 acres yield a return of more than $1,200,000. Here in truth are lessons which our own republic might profitably lay to heart.

In the Russian section, photographs and maps convey information as to the areas covered by forest lands, and also reproduce the imperial hunting parks, and the pavilions erected thereon. Leaves and seeds are displayed in mounted specimens, and the department of the Volga furnishes models of the ovens used for boiling pitch, and the rafts that convey it to centres of shipment or consumption. The St Petersburg institute of forestry sends a collection of wooden implements from the peasantry, and the government of Kazan has a collection suggestive of the apiarian industries of that section of the empire.

Adjoining the New South Wales section, Mexico shows her woods, roots, fibres, dye-stuffs, and medicinal products. Four hundred different species of native woods are here displayed in the 2,000 polished specimens contained in a simple, rustic pavilion, its square main entrance, composed of disks, presenting a unique appearance. Resins, vegetable wax, copals, such as are used in the manufacture of varnish, and chewing gums, add variety and interest to the exhibit.



CARVED DOOR OF TEAK WOOD



LOGGING TRAIN

Tocantins, a tributary of the Amazon, a separate structure within the pavilion being composed of specimens from the forests of the great river. Among the collection are also samples of inlaid wood-work and basket-work.

Of somewhat similar character are the exhibits of the Argentine Republic and Paraguay, each having some 300 varieties of wood and many medicinal plants. In the Argentinian section is a crocodile dragging its unwieldy frame over a mahogany stump. The main collection of woods is in the form of a truncated pyramid, surmounted by an octagonal block of fragrant cedar.

Crossing the central nave we come to the exhibits of Spain, the Philippine Islands, and Cuba, the features in which are the huge square timbers of Cuban mahogany, and the Spanish collection of native woods and corks. Close to the northern portal of the Forestry hall is an enclosure surrounded by a high bamboo fence, within which are the choicest of Japanese forest products. A special effort is made to show the adaptability of the woods to receive a hard finish, and the delicacy of their graining. A rough, brown piece of wood, labelled cinnamora camphora, is a specimen of the tree from the roots of which the camphor of commerce is manufactured. There are also such articles as bamboo, rattan, and lacquer ware, sago-palm baskets, wooden water-pipe, palm-ropes, charcoal, seeds, sap, nuts, and sections of trees, great and small.

Brazil, the Argentine Republic, and Paraguay have remarkable collections of the woods used for ornamental purposes, together with barks, dyes, and medicinal herbs. The first has a large pavilion fashioned from small trunks and interlacing limbs, its main entrance in the form of an archway of Gothic architecture. Mahogany is a prominent feature, for this is one of the most valuable of Brazilian woods. Perhaps the finest of the cabinet woods are from the banks of the



LARGEST LOAD OF LOGS EVER DRAWN BY ONE TEAM

The national department of agriculture and commerce sends a collective exhibit, comprising timber and planks, cabinet, ornamental, and fossil woods, barks and galls for tanning and dyeing, vegetable wax and resins, wood pulp for paper, and maps, plans, and illustrations of forest management. Colored pictures of various trees and flowers are shown, and upon the outer walls of the pavilion are depicted in graphic art wild scenes of the mountain forests.

Adjoining this, in the northwestern corner of the hall, is the Indian exhibit, where a British trading corporation displays samples of teak flooring and wood paving, railway wheel blocks, and specimens of fabrics dyed with cutch. Elsewhere are planks and slabs of vermilion and



MICHIGAN LOGGING CAMP

padouk, and a large door made of teak, the original of which is in the royal palace of Mandalay, Burmah. Upon it are scores of carved figures and architectural forms, representing the city, the king, queen, ministers, and the guardian spirit of the municipality, with other mythological characters.

Embedded among the individual and state exhibits are those of Siam and Trinidad, the latter with samples of rich red purple heart, of balsam, mangrove, guava, redwood, Spanish ash, and bamboos, in many sizes, together with specimens of what has been accomplished in several lines of manufacture. In Siam's collection, diagonally opposite from that of California, are more than 200 specimens of native woods, some of the smaller varieties in the form of baskets and rustic stands. The lordly teak is king of all, one solid slab, highly polished, being nine feet long, and six in breadth. Large sections of the taback and tamarind are also among the evidences of the forest wealth of Siam.



MODEL IN SILVER OF THE HORTICULTURAL BUILDING

World's Fair Miscellany.—Adjacent to the Horticultural building are propagating houses and frames, where space is assigned to exhibitors for growing valuable plants such as will not bear transportation. Here also are illustrated modern improvements in construction; a Swiss inventor, for instance, erecting a green-house of glass bricks which he claims to be proof against cold, hail, and other destructive agencies, while others show their systems of steam heating, ventilation, etc. A considerable area is also used for replacing faded or injured specimens.

Both for heating and sprinkling ample provision was made. For the former purpose there were three boilers, each of 150 horse-power, and an elaborate system of engines, fans, and steam pipes, by which the temperature of the dome and the front curtains of the hall were adapted to the most delicate of tropical plants.

Near where the Midway plaisance joins Jackson park are the nurseries for the propagation of trees and berries. A large plat on the northern side of the avenue is planted in California oranges, lemons, figs, apricots, peaches, prunes, grapes, etc., and on the opposite side France shows her careful and scientific methods of raising pears, peaches, grapes, and other fruits. There is also a large collection of evergreens in this locality, with a Wisconsin cranberry bog, showing all the processes of flooding, draining, and cultivating. Mexico has a section filled with characteristic plants; New York demonstrates how she would train grape vines, and a firm which manufactures nitrate of soda produces vigorous plants, nourished and stimulated by this fertilizer, side by side with others which, for want of it, appear as though sick unto death. In one corner of the nurseries is a mass of rank vegetation over which is a sign with the inscription, "What to Hit with the Hoe." Here are 125 varieties of weeds in actual growth, the exhibit being organized by a leading agricultural journal.



IDAHO EXHIBIT



Among the curiosities of Horticultural hall are the American fly trap and the California pitcher plant. The leaves of the former are furnished with slender, comb-like teeth, the upper surface being set with slender hairs which are extremely sensitive. When touched they contract and draw the leaf together like a book, entrapping the fly and holding it fast as long as it is able to move; when the insect

is dead and motionless, the leaf unfolds. The lower portion of the pitcher plant is set with long bristles, inclined downward, like a certain kind of patented mouse-trap. Thus the unwary insect falls into the water with which the pitcher is partially filled.



CALIFORNIA WINES

To foreign countries was assigned about one-third of the entire space in Horticultural hall, and so great was the interest aroused that they would have taken the entire area had they been permitted. The first exhibit was received in the winter of 1892 from New South Wales, whose wines also received in midwinter were frozen and spoiled, but promptly replaced by other specimens.

Except for wood-pulp the Forestry exhibits contain no completely manufactured articles, though there are many in various stages of manufacture. In showing the structure and commercial value of woods, the usual method was to cut them into transverse, radial, and oblique sections, showing the heart and outer portions of the tree, leaving one-half of the specimen in its natural state, and polishing the remainder. There are also barks, gums, resins, and turpentines; lichens, mosses, and substances used for bedding and upholstering; specimens of herbs and roots having medicinal properties, and cork, both in rough sections, and partially manufactured. As a rule the states exhibit the wealth of their forests in their crude condition, while individuals display material in shapes which fall just short of manufactured products.



Not far from Machinery hall, Michigan has a typical loggers' camp. Everything is built of logs, even to the large chimneys of the cabin. In and around the building are specimens of all the tools used by Michigan lumbermen, from the opening of the first camp down to the present time. The dining room is remarkably neat, as also are the bunks, with their frames made of tree limbs. Side-tracked near the model is a lumber car, piled high with huge logs. The load weighs nearly 290,000 pounds, contains more than 36,000 feet of lumber, and before being delivered to the railroad in Michigan, was drawn on a sleigh for a distance of a quarter of a mile by a single span of horses.

California's exhibit in the Forestry building is a forcible reminder of the wonders of forest life on the Pacific coast. Attention first centres in the *sequoia gigantea*, as is called the king of all the big trees which have made California famous. They attain a height of 300 to 350 feet, and are the tallest conifers in the world, averaging fully twenty-five feet in diameter.

New South Wales and Mexico each claim to have within their domain the largest tree in the world. The Australian giant, a species of fig tree, is 485 feet high. Through the president of her commission, Mexico asserted that in the state of Oaxaca there was a tree of the leguminous species 53 feet in diameter, and while its height had not been ascertained, it was undoubtedly the king of the vegetable world. It has been christened Santa Maria del Tule.



"POMONA"

Besides having one of the largest displays in the building, Missouri contributed to the colonnade of trunks which surrounds it, specimens of yellow pine, oak, red oak, cypress, hickory, red gum, and ash. According to state authorities, the counties lying along the Mississippi river might have furnished much larger samples than those presented at the Fair. Nevertheless they are large enough to impress the visitor with the commercial value of timber trees which, not many years ago, were viewed simply as impediments to the agricultural advancement of the state.

Of the western states perhaps Minnesota has aroused more general interest on the subject of forestry than any other, realizing, as she does, the evils resulting from the denudation of her timber tracts. Here it is well understood that aside from increasing the beauties of the state, arboriculture equalizes the temperature and rainfall, breaks the force of wind and flood, supplies material for fuel and fencing, and furnishes an ultimate supply of timber which must become most valuable if the natural wealth of the state continues to be drained away.



A BIRD'S EYE VIEW

CHAPTER THE SIXTEENTH

MINES, MINING, AND METALLURGY

PASSING from the main railway terminus, the visitor observes on his left a building of elaborate design, the purpose of which is indicated by the single word inscribed above its portal. In this, the hall of Mines and Mining, its architect, S. S. Beman, of Chicago, has departed somewhat from conventional types, displaying, without any detraction from his harmony of plan, an adaptation of structural forms to practical uses in perfect keeping with what may be termed the sentiment of his composition. Fronting on the main court opposite the great hall of Machinery; flanked on one side by its sister edifice devoted to the Electrical department; on another by the Transportation pavilion, and with the graceful lines of the Administration building giving further emphasis to this imposing group, Mr Beman was thus favored with one of the choicest sites in the Exposition grounds, and to the best advantage has he improved his opportunity.

First of all it may be observed that in studying his design the artificer must prepare for the housing of a large and bulky display of ores and minerals, of mining and metallurgical machinery and appliances, many of them requiring a liberal proportion of floor room and height. Hence, in this building, and especially in its central nave, it was necessary to avoid, as far as possible, all columnar obstructions, leaving unencumbered the greatest available area for the reception of exhibits. Of the space at his disposal, including with galleries somewhat less than nine acres, a large portion was devoted to a nave 630 feet long, in its centre a circular court from which the main avenues radiate, and where is a design typical of mining industries. In all this spacious nave there are only sixteen pillars, eight on either side, and on which rests the system of cantilever trusses that support a lowered roof, fashioned largely of glass, and at its highest point nearly 100 feet from the floor. The aisles, which divide the building into four main sections, are similarly treated, and with their columns anchored against the inner rows. Thus is relieved the comparative depression of the curtain walls, whose height from ground to cornice is little more than sixty feet.

A further accentuation is given by the principal entrances, one in the centre of each of the four sides, those on the north and south 80 feet wide, with richly decorated cornices, and flanked by pilasters, on which rest banner staves, their flags imparting to the outline somewhat of a holiday appearance, and modifying the serious aspect of the design. Around all the entrances are monuments, designs, and figures in keeping with the exhibits contained within. At the corners are square pavilions, lighted by arched windows on either face, and with low domical roofs crowned with circular lanterns. Between these pavilions and the main portals are piazzas 25 feet wide, with coffered ceilings, and from which there is access to the interior at several points. From either side of the entrance-halls broad stairways lead to windowed galleries, 60 feet wide, and affording an additional floor space of more than 100,000 square feet. Thence, from numerous openings, the visitor may step forth into recessed balconies, from portions of which is an excellent view of the structures and grounds adjacent.



MINING EXHIBITS FROM THE GALLERY

In the elaboration of his design the architect has not adopted any special order of architecture, for in doing so he could not have given to his scheme an architectural expression in conformity with the character of the exhibits. The façades are of modern style; the roof planned somewhat after the fashion of those which cover the car-building sheds of the Pullman company. Elsewhere, and especially in the entablatures, are traces

of Italian detail, mingled with that of the French renaissance, while in the loggias and balconies the treatment savors of the Doric and the earlier Romanesque. Finally it may be said that, whether from an architectural or utilitarian point of view, the hall of Mines and Mining does not suffer by comparison with its more imposing neighbors.



MODEL OF COAL MINING MACHINERY

As with the Fisheries and several other departments, this is the first of our great world's fairs at which mining has been placed on an equality with manufactures, agriculture, and all the more prominent industrial pursuits, and its exhibits ranked on a par with any, and housed in a building of their own. At the London and Paris expositions all such specimens were classed in a single group, to which was granted but a meagre allotment of space; and even at our own Centennial Exposition they were pushed aside into an annex of the industrial edifice. Here, however, due prominence is given to an industry which in value of production ranks third among those of the United States, many of its branches, before incorporated in other divisions, for the first time receiving in their proper place a fitting and adequate representation.

Says the chief of this department, referring to the scope and character of the exhibits: "They will cover the entire range of the mineral kingdom. They will include minerals of every kind, ores, native metals, gems, and crystals; geological specimens; coal, coke, petroleum, natural gas, building stones, and quarry products; graphite, limestone, cement, and artificial stone; salts, sulphur, fertilizers, and mineral waters; the long catalogue of iron and steel, and of tin, and the new metal, aluminium; the extraction of gold, silver, and lead by various methods; mining machinery, tools, and appliances; literature, models, and reproductions. When we consider the wealth represented by the quarries of New York and the New England states, the coal and iron of the Alleghanies, the phosphates of Florida and the Gulf, the oil and gas of Pennsylvania and Ohio, the copper of Lake Superior and the tin of the Black hills, the silver and lead of the Rocky mountains and the gold of California; with the immense manufacturing interests connected with the production and manipulation of our country's vast mineral wealth, remembering that there come into competition with her all countries and quarters of the globe, the varied and exceptional character of the mines and mining display will be appreciated."



INTERIOR OF MINING BUILDING



PENNSYLVANIA BRICK AND TILING

On entering the hall which contains these exhibits, the first question the visitor asks himself is "How did they get here? How were these mammoth specimens collected and transported from every quarter to be placed in congruous and symmetrical groups under the roof of a single edifice?" Perhaps in no time or place but the present could they have been got together; for years of persistent solicitation and careful planning were required before the more bulky articles were rolled

on cars to the principal entrance way, to be lifted by cranes and moved on trucks into position. From the spacious central nave, sometimes termed Bullion boulevard, extend eastward the state and territorial pavilions or structural façades in metals or minerals, beyond which is the mining machinery; while to the west our foreign friends show what their several countries can produce. Among United States exhibits Montana's silver statue, Pennsylvania's needle of anthracite coal, and the geological obelisk of the empire state attract much attention. Among those of other lands may here be mentioned the elaborate collections of Germany, Mexico,



EXHIBIT OF THE EMPIRE STATE

Canada, and New South Wales, and the diamonds which in the spectators' presence are washed by Kaffirs out of the blue earth imported from Kimberley mines.

On the gallery floor the largest of the individual exhibits are those of the Standard Oil company, and the Frick Coke company, the former displaying the several methods used in the production and distribution of oil, and the latter a model of their plant. Of scientific interest are the metallurgical displays arranged by the chief of the Mining department, and the collections of the Ward Natural Science establishment. In a series of courts are arranged in related groups all mineral substances of industrial, economic, or scientific value, with an assaying department in actual operation. Nor should mention be omitted of the library, catalogued for public use, and containing histories and statistics of mines and mining districts, with numerous charts and diagrams, together with maps and models illustrating the geological formation and distribution of mineral veins, and the modes by which they are worked. To the mining engineer or surveyor the collection is especially valuable, for here are treatises on every branch of his profession, including among others the location of shafts



MINING BUILDING. NORTH FRONT



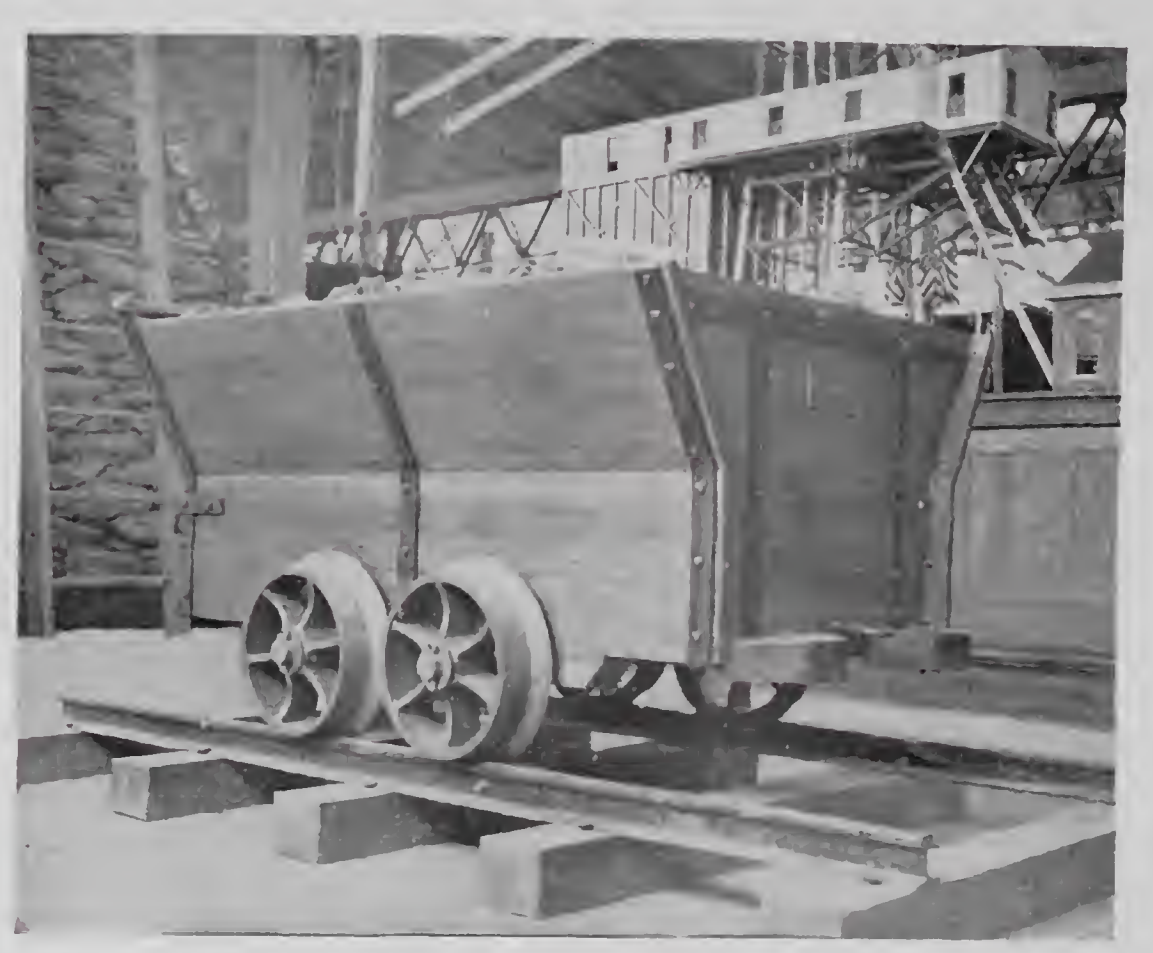
PLUMBAGO, NEW YORK SECTION

and tunnels, their sinking or boring and timbering, the sloping and hoisting of ore, and the drainage, lighting, and ventilation of mines. Finally, the visitor may compare the present with ancient methods, for there are some of the earliest apparatus used in mining and metallurgy, either as originals or reproductions.

Coal and iron are treated in broad lines; for in the United States these industries represent the investment of hundreds of millions of capital and afford employment to hundreds of thousands of men. Of bituminous coal the annual yield exceeds 100,000,000 tons; of anthracite nearly half as much, and of pig iron about 10,000,000 tons; the total value of their output, the two first as delivered at the mines being estimated at more than $300,000,000. Next in order of value, or very nearly so, are silver, building stones, copper, lime, gold, petroleum, natural gas, lead, and zinc, these and other metals and minerals increasing the total production to about $650,000,000 a year. In the exhibits contained in the Mining hall, quality rather than quantity is the feature of the display; and here the visitor may learn more in this connection than years of travel could teach him. In the coal collections for instance, are not only the varieties produced in different regions, but with many of the specimens are chemical analyses, and the results of tests whereby have been demonstrated their economic value and adaptability to special uses, with geological and other maps and drawings showing stratification, extent, locality, accessibility, and other valuable data. And so with iron and other products, all the groups being arranged and illustrated with special reference to the industries which they represent.

Near the northern portal of the hall, flanked on either side by the pavilions of France and Pennsylvania, is a lofty monument fashioned of cubes, which gradually decrease in size almost to a point. Those at the base are of massive proportions, and on several of them are inscribed the words anthracite, limestone, natural gas, petroleum, iron ore, and granite. Then come salt and other minerals produced in the United States, nearly all of commercial value having a place in the column. In these cubes are represented the proportionate bulk of all the minerals which come from the mines and quarries of this country during one second of time, asbestos forming its tip, gold ore second, and silver ore only a few removes from the top.

Within the entrance of Pennsylvania's pavilion are displayed her petroleum and petroleum products in hundreds of glass bottles contained in neatly finished show-cases. Facing them is a large relief map of the state, representing the location of her principal coal and iron mines, her oil and natural gas deposits, blast furnaces, pipe systems, and railroads. In a small pavilion are shown the various uses of slate, as for pillars, roofing, walls, and black-boards. On the western side are exhibited in the form of truncated pyramids, grouped in rectangular shape, all the varieties of anthracite, with commercial samples and analyses, while at the corners of the rectangle are samples of bituminous coal. A colored drawing illustrates the manufacture of zinc oxide and spiegeleisen, the latter largely used for the manufacture of Bessemer steel. In bricks and other samples, crude and burned, are shown the many varieties of fire clay found in Pennsylvania, and next to these are tile clays in every form. There are also more than 100 specimens of building stones, with glass sands, the mixtures used for various kinds of glass, and the finished product. Soapstone, nickel, manganese, iron ores, and the several stages in the manufacture of iron, with the charcoal, anthracite, bituminous coal, and coke used for such purposes, are also on exposition.



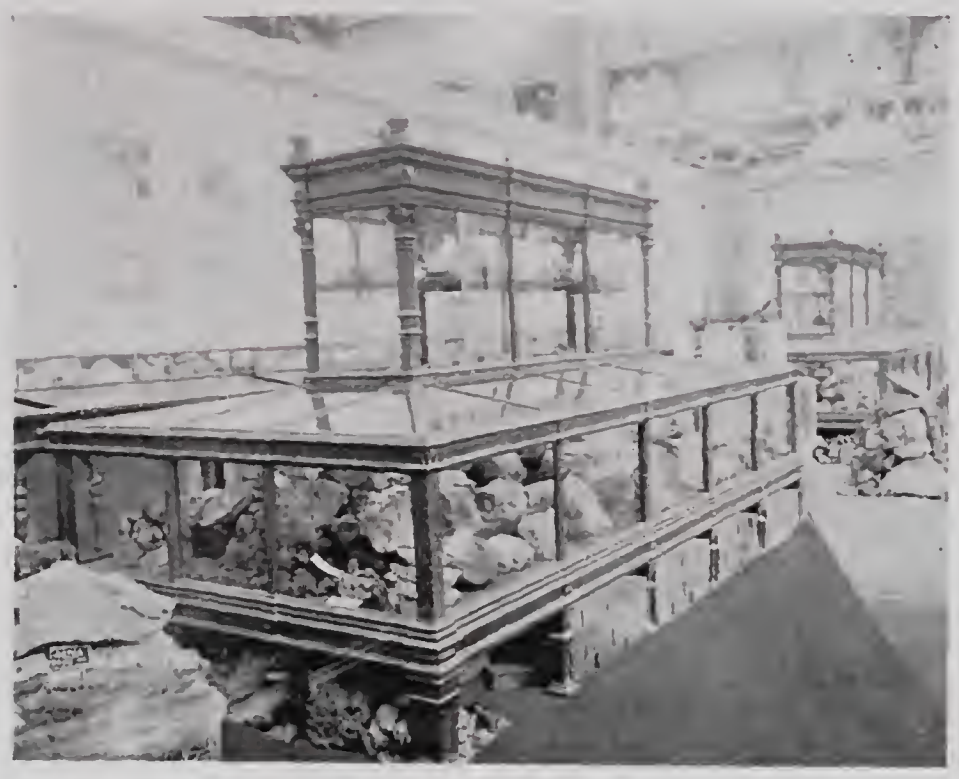
COAL CAR FOR MINING

An interesting exhibit is a complete working model of a coal mine, with engines and the work they do, from hauling coal up the incline until it is dumped into the screens and there assorted into sizes and loaded into railroad cars. Near by is a primitive iron furnace, of a pattern more than 1,000 years old, and grouped about it are rude implements such as Tubal Cain might have used. On the walls are photographs, charts, and maps of geological and mineralogical surveys, with relief maps and other illustrations.

But the most attractive feature is in the central court of the Mining hall, where is the shaft or so-called needle of anthracite already mentioned. This trophy is fashioned of solid blocks of that mineral, extracted from

the Mammoth mine of the Lehigh Valley Coal company. It is more than 50 feet high, weighs nearly 100 tons, and to mine and place it in position was the task of many weeks, involving an outlay of several thousand dollars. The entire collection from Pennsylvania is gathered and arranged as a utilitarian rather than an ornamental display, and shows to excellent advantage her rich and manifold resources.

The exhibits of the empire state are also of a substantial character, with no attempt at ornamentation except for the pavilion which contains them, and a pagoda of terra cotta in one of its corners. The former is in the shape of a rectangular colonnade, the entablature resting on Ionic arches springing from pillars of uniform design, and the corners surmounted with handsome balustrades. The cornices and frieze are decorated with sculptured tablets, and the spandrels between the arches are ornamented with representations in relief of mining scenes and implements. In front is an obelisk constructed of rocks in the order of geological succession, the device of the geologist James Hall. Here it may be mentioned that, apart from local collections, this is the only complete exposition that New York has ever attempted of her geological formation and mineral resources, though in this state is found the keynote to the geology of a vast adjacent region.



A MODEL DISPLAY

Among the exhibits are samples of all building, ornamental, and other stones of commercial value, of which the state possesses an abundant store. There are likewise specimens of the solid crystalline salt deposits peculiar to her soil, with clays, gypsum, sands, and shale, the first including kaolin, and displayed in raw and manufactured forms, together with mineral paints, iron ores, and petroleum. A feature in the collection is the beautiful specimens of quartz and fluorite, and on the gallery floor is a large assortment of precious stones and minerals contributed by a New York jewelry firm.

Adjoining the New York section on the east is the New Jersey pavilion, the greater portion of which is devoted to an exposition of her geology, illustrated by a large relief map. Along the walls are cabinet specimens of ores, building stones, and potters' clay, in the last of which the state is especially rich. Her production of zinc is somewhat remarkable; and here the information is conveyed that of the 1,000,000 tons of ore produced in the United States since 1873, 719,000 were contributed by New Jersey.

Either in the western galleries among the metallurgical groups, or in the eastern galleries among the specimens of building stone, all the New England states are represented with the exception of Rhode Island. From the Colby university of Waterville, Maine; from the Portland society of natural history, and various private sources, are collections of minerals and gems, a quarry company contributing a large urn of polished granite and a variety of smaller specimens. Harvard college sends to the Massachusetts section many rare fossils, large slabs of stone showing the foot-prints of some mammoth of the antideluvian era. Granite and marble, gneiss and hornblende, corundum, emery, and graphite, with an abundance of ores and gems, virtually complete the collection of the old Bay state.

New Hampshire, Vermont, and Connecticut display their granites and marbles in the eastern galleries. In the New Hampshire collection are many specimens of mica, and pillars and a massive table are constructed of the stone for which that state is famous. The granites of Connecticut, principally gray and red, are also the prominent feature of her section. Vermont, while showing several beautiful varieties of granite, upholds her reputation as the producer of some of the best marbles from the quarries of the United States, the specimens being displayed in a circular portico of Grecian architecture. Many of the cases within contain cubes of the best known American varieties, and the famous marble quarries of Rutland contribute largely to the general effect.



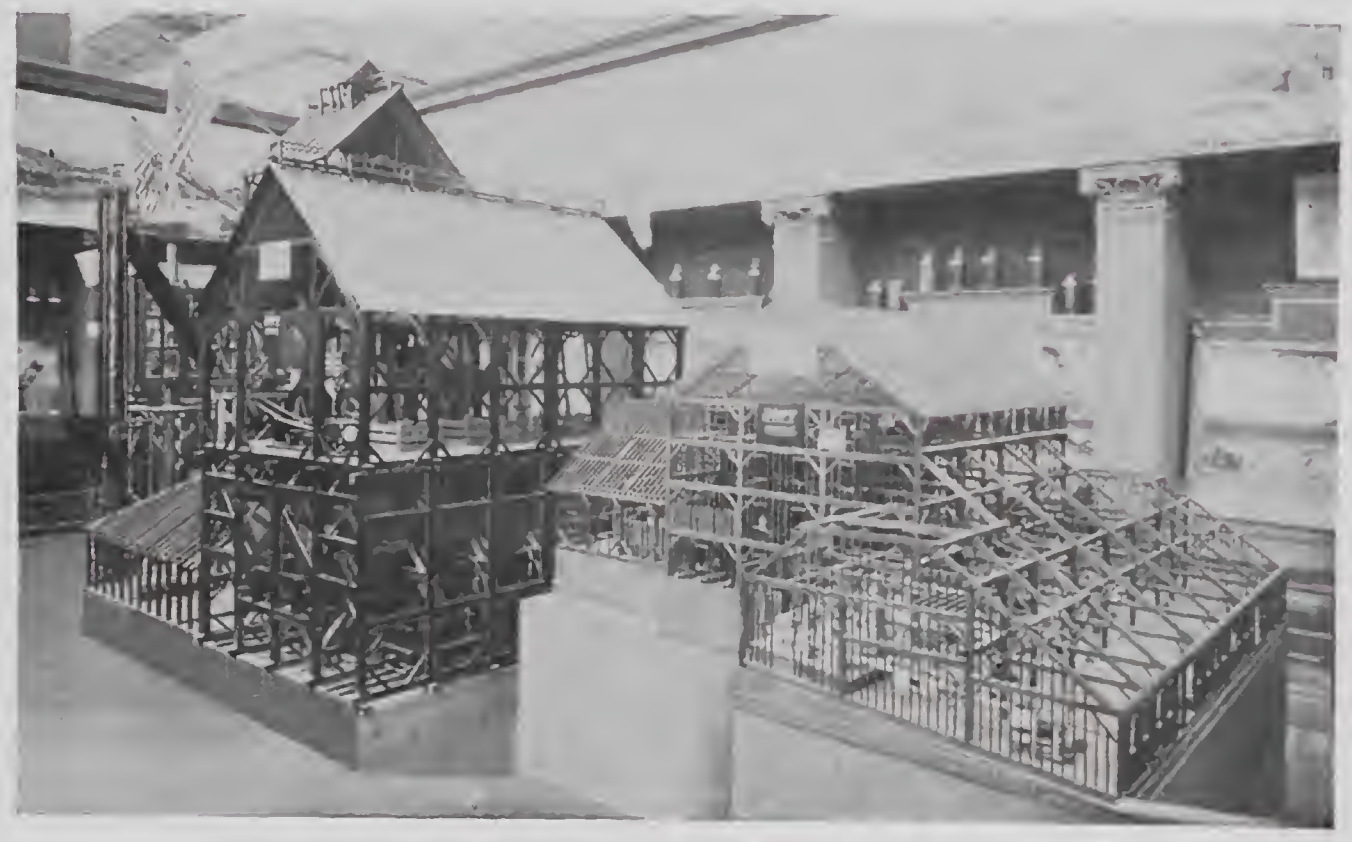
SECTION OF MINERAL CABINET

One of the most interesting and unique of the scores of pavilion elevations in the Mining hall is that of Kentucky, in the background of which is depictured the entrance to her mammoth cave, while beneath it is reproduced a section of the cave, to which a trap-door affords access. The façade is a temple-like structure



GENERAL VIEW DEPARTMENT OF MINING

of Gothic architecture, and, together with the wide open archway in the centre, is built of cannel coal, its effect increased by contrast with the white marble edifice of the empire state. Its plan was suggested by the portal of the Virginia Military institute in Stonewall Jackson's native town. While consisting largely of coal, as might be expected from a region with 14,000 square miles of bituminous coal deposits, and with a yearly output of more than 3,000,000 tons, the exhibits of Kentucky are as varied as her resources, and include marble and other valuable stones, tile-clay, copper, iron, gold, and silver, all displayed as minerals, ores, or metals to the best advantage.



MODEL OF MICHIGAN MINING BUILDING

Ohio's section is enclosed by a handsome colonnade, constructed entirely of minerals found within her borders, and intended to present in picturesque form her resources in that direction. One of the passage-ways is fashioned of tiles, and extending over the entire length of the floor space at the northern end are alcoves containing specimens of quartz. In show-cases are mining and mineral samples, and in the centre are models illustrating the manufacture of table salt and the machinery used for pumping oil from Lima's productive wells. In the galleries Ohio is well represented in the metallurgical exhibits organized by Frederick J. V. Skiff, the chief of the Mining department, and here also are several collections from her university and colleges of agriculture and the mechanic arts.

Representing as they do one of the most prolific districts in the production of building stone, the exhibits of Indiana, both in the construction of her pavilion and its contents, are somewhat of a uniform character. The four granite pillars which support the entrance harmonize in coloring with the whitish grey of the limestone, the latter a prominent factor in the mineral wealth of the state. The quarries at Bedford are especially noted, and thence were gathered the bulk of the limestone specimens ranged along the centre of the section. Opposite are large blocks of coal, for which Indiana is famed, both as to quantity and quality of output. Elsewhere are cabinet specimens of building stone, and samples of petroleum oil, brick, tiling, and other clay products, while near the western entrance to the Mining hall is a stately pillar of oolitic limestone from Bedford deposits.

Michigan occupies a place of honor, fronting on the central court, and with the largest space allotted to any of the state exhibits. Among the materials used for her pavilion are specimens of building and ornamental stones, with other minerals taken from Michigan mines and quarries. The archway is of native sandstone, its dome-like interior lined with copper, on which are displayed the mineral products of the state fashioned in the form of shields, with the coat of arms on medallions, and above all an allegorical group representing two miners whom the presiding genius of that industry is crowning with wreaths of laurel.



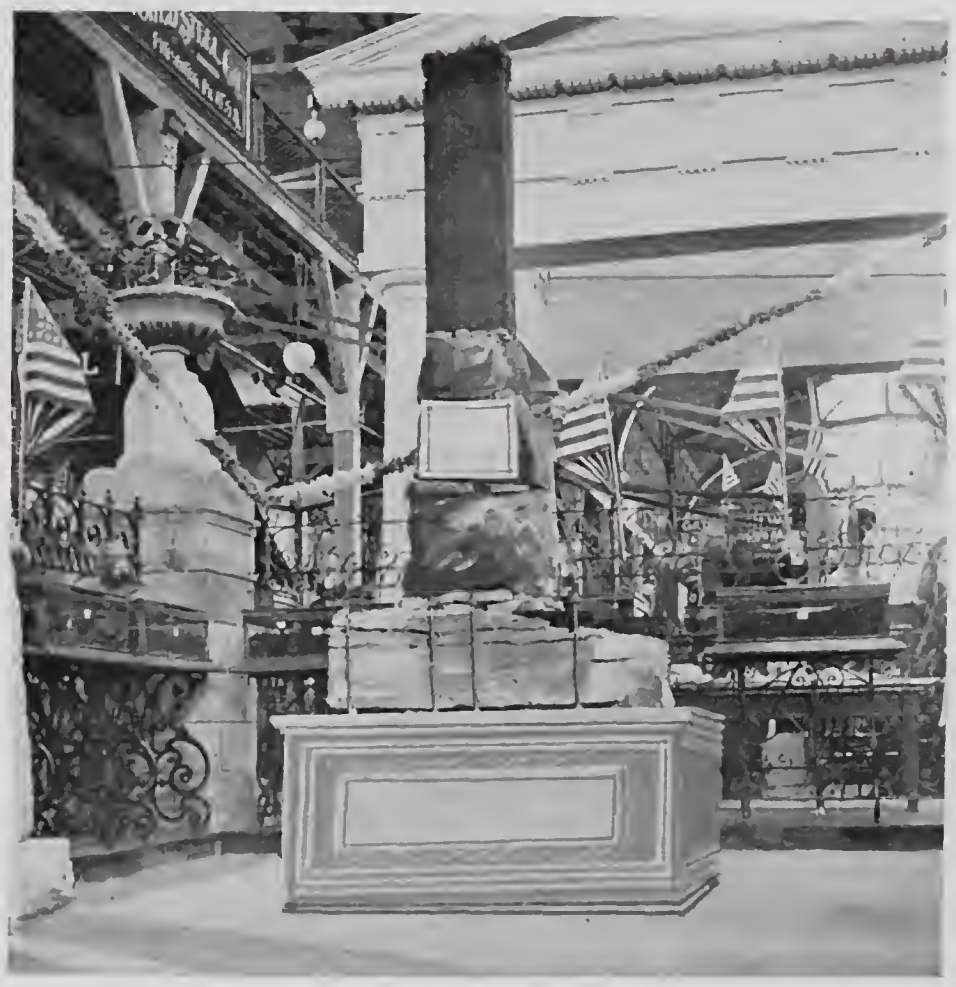
A COPPER MONSTER

Fronting on the central nave is a large diagram showing a cross section of a mine operated by the Cleveland Cliffs Iron company, and representing its geological formations, with the system of shafts sunk to three successive levels before the ore body is reached. On two of the interior walls are pictures of the more prominent mines in the upper peninsula, as the Pittsburg, Barnum, and Salisbury, around which are heaps of timbers and snow-covered piles of ore. The famous Calumet and Hecla mines, and the stone quarries of Marquette, are also reproduced in graphic art; and among scenic views are those of Lake Angeline before its waters were drawn off, and of Todd's harbor and Isle Royal. One of the exhibiting companies shows the levels of its mine in sheets of glass on which are indicated the locations of drifts and tunnels, while elsewhere are models of machinery, mills, and reduction works.

Michigan's display of minerals is both interesting and instructive; including specimens of the richest iron ore found within the state. There are samples of gold ore found near Ishpeming, assaying $10,000 to the ton,

with silver ores, marble of different kinds and colors, verde antique and serpentine, and granite and whetstones. These specimens are for the most part taken from private collections, as are also graphite, fire and common clay, fire sand, coal, amethyst, agate, and chlorastrolites, the last a beautiful mineral, and found only in Spain and on Isle Royal in Michigan. Among other samples here displayed in profusion may be mentioned red analcimes, abophylites, prehnites, dalholites, stilbites, dolomites, and calcites. Then there are pipe ores, kidney ores, needle iron ore, grape ores, epidotes, and calcite crystals, containing native copper, yet indeed representing but a tithe of the more valuable and useful portion of the collection.

But copper is the main feature in the Michigan section, and in truth the display is a generous one, including native copper, copper ingots, bars, sheets, cakes, and wires; rag, nail and fan copper; ores, conglomerates, and amygdaloids; battery and tailing samples, and copper in what other forms soever it is found or fashioned. The largest mass is of native copper, weighing 8,500 pounds, with others almost as bulky, composed of the richest of ores and conglomerates. In the centre of the pavilion are two mounds of copper, one constructed of wire, at the base of which are sections welded by an electrical process whereby wires can be produced of indefinite length.



FROM THE FAMOUS PIPESTONE QUARRIES

Among the more curious exhibits are prehistoric tools found in the mines, fashioned of native copper, and in the form of knives, spear and arrow heads, adzes, and hammers. These are among the state contributions; and no one can tell how they were made, for the metal is hardened and tempered by a process which modern scientists and mechanics have failed as yet to discover. As to this process it can only be said that thousands of inventors have tried in vain to reproduce it, and that to the aborigines of the Lake Superior region was known what is now a lost art, whereby weapons and tools were made such as cannot be duplicated by the most improved of modern methods. Says the official in charge of this exhibit: "It is claimed by several that tempered copper is now being placed on the market; but if the art is ever to be discovered, it has not been achieved so far. I have heard of men who have seen weapons or tools of the aborigines that would turn the edge of a steel chisel or dull a file."

The state which contains the home of the Fair reserves her strength for the machinery department in the Mining hall, and is mentioned in that connection. In Wisconsin's collection are fully illustrated her abundant mineral resources. Shafts of polished red marble support the arch above the entrance way; at the corners are monoliths of sandstone, and within is a temple-like structure, its dome upheld by fluted columns with Doric capitals. The floor is of black and white tiling, and the materials for the outside walls were furnished from Bayfield quarries. In the centre of the pavilion is a pagoda, at the corners of which are bars of lead and piles of iron, zinc, and galena ores. In pyramids and other forms are all the economic minerals and metals of Wisconsin, in raw or manufactured forms, including marble and granite; bricks, tiles, and terra cotta; jasper and serpentine; iron, copper, zinc, and lead; brown hematite of ochre, mineral paints, and the sands that are used for the making of glass. From Milwaukee are specimens of the so-called Wisconsin pearls, and from not a few of the exhibitors are entire cabinets of specimens, for many counties have contributed to the display.



ORES OF WISCONSIN

Minnesota's home in the Mining hall is east of the Ohio section, her booth partially enclosed by a bronze fence of scroll-work, and the entrance-way of building stone from her principal quarries. Within is a remarkable display for a state that has but recently attempted mining on any considerable scale. Her principal exhibits are of iron, large contributions coming from the region tributary to Duluth, and including a great variety of specimens. About thirty companies are represented, and the samples shown by each contain not less than 63 per cent of metal, while several show nearly 70 per cent, a remarkable average considering the extent of territory from which they were taken.

Of iron ores there are many exhibitors, including a carefully selected group of specimens. Of building stones there is a special contribution containing 100 varieties, with samples of bricks and the clays from which they were made. From Duluth is a fine specimen

of Lake Superior amethyst weighing 300 pounds. A group of jasper shows the highly polished quartz; another is in the rough, and a third consists of carved figures from stone of a reddish hue. From Sioux valley is also a handsome shaft of jasper polished by hand. Granite is well represented, especially in a pillar and shaft of this material, the latter of the speckled variety from Rockville. There is slate from Cloquet, brown stone from Duluth, and other varieties from various parts of the state. A unique structure is in the form of a mound, its base of Indian pipestone, upon which is a layer of jasper, then several feet of earth, with the greensward for a covering. The lower portion of the mound was quarried from the red pipestone quarries on the national reservation in Minnesota, near Pipe Stone City, and said to be the only quarry of its kind in the world. Since time immemorial the American aborigines have used this substance for their peace-pipes which Longfellow has described in his Hiawatha.

Among other features of interest is a model of the Chandler mine at Ely, showing the shaft houses, tools, and mining apparatus, as well as the geographical formation and the different levels, with the process of mining, hoisting, and timbering, and with miners carrying lanterns on their heads. Arranged along the inner walls are charts illustrating the geological survey of the state, while a large map shows the underground plan of the Minnesota mines at Soudon.

Beneath the stairway at the southern end of the Mining hall are the coal pillars of the Iowa pavilion, to which an ornate appearance is given by the judicious use of colored clays and sands. Within are mounds of iron, lead, and zinc, a miniature grotto constructed of material gathered from the caves of Dubuque county, and the display of a Centerville coal company, consisting of models of its works and cars, installed upon a platform of coal. There is also shown the interior of a coal mine, with full-sized figures of miners at work, and a truck filled with coal on the track ready to be hauled to the surface. The depth is only twenty-five feet, but by an ingenious device appearing as though it were several hundred feet. The mouth of the pit, over which are the words Iowa Black Diamond Hollow, is surrounded with solid blocks of coal. Adjoining the pavilion proper are cabinets of economic minerals, and a small section in which are shown by a marble company specimens of its stone in raw and manufactured forms.



SECTION OF MISSOURI PAVILION

To Missouri was assigned one of the four sections around the central court, where also are the exhibits of Michigan, Germany, and Great Britain. Her tasteful pavilion, with its handsome portal and colonnade, its decorated frieze and balustrade, is composed almost entirely of materials furnished by the state. The base is of granite from the syenite quarries of southeastern Missouri, the walls of brick from St Louis county, and the pillars, capitals, and frieze are of terra cotta. At the principal entrance-way are panels of onyx, and the coat of arms above it is surmounted by an eagle, with garlands depending from the shoulders of cupids.



SOUTHWESTERN ZINC

Within this structure are worthily represented the resources of a state which in 1892 produced more than 3,000,000 tons of coal, 131,000 tons of iron ore, of zinc ore almost as much, and 32,000 tons of lead; her yield of these metals for the year being estimated at $9,100,000, and the entire output up to that date at $178,000,000. On tables and in glass-covered show-cases of polished oak are countless labelled specimens, with photographs and models indicating mineral localities and features, and with mineral production and distribution displayed in chart and diagram form. In the centre of the pavilion is a large relief map showing the areas and locations of all the principal deposits of economic minerals. The value of the entire display is further increased by its methodical arrangement, with inscriptions and labels for the various groups of products, and for each of the specimens of which the groups are composed.

While coal, iron, lead, and zinc form the bulk of the display, there are numerous specimens of other metals and minerals, including copper and silver ores; blendes of various kinds; calcites, calamites, dolomites,

and siegenites; ochres, glass-sand, clays, and bricks; sandstone, limestone, marble, and granite. Zinc is a special feature in the collection, as befits a state which produces more than one-half of the entire output of the United States. Some of the specimens are remarkable for range and brilliance of coloring; their shades varying, from black to a lightish yellow, while colorless crystals are arranged in tasteful groupings. The mineral is displayed in every shape, beginning with the crude ore as it comes from the mine, and displaying each successive stage up to the completed product in all its commercial forms. Lead is similarly treated, and near a table on which is a 1650-pound mass of zinc ore is a group of nearly perfect cubes of galena weighing 500 pounds, and almost entirely of pure lead from the Joplin mines. In the centre of this section is a pedestal of solid metal formed of specimens from various smelting works throughout the state. At the southeast corner is a pyramid of ore built of specimens ranging from a few pounds to several tons. From Greenfield quarries comes a handsome marble altar, and from St Louis county, a sample of nickel sulphide, of special interest to mineralogists.



MISSOURI LEAD

Arkansas, Missouri's geographical neighbor, occupies only a few square feet of space in the extreme southwestern corner of the hall, among the exhibits of Latin-American republics. There the state is represented by a small collection of minerals, consisting mainly of carbonates of zinc.

Upon the frieze of South Dakota's tasteful pavilion is the inscription: "First in gold mining machinery, first in new mines, and second in gold." In support of this claim are exhibited some remarkable specimens of gold ore, though perhaps more noteworthy is the collection of tin ores from Harney peak. Coal is but feebly represented; for the extensive deposits of South Dakota have as yet been little utilized. In the rear of this section are two life-size figures carved in sandstone, one of a pioneer prospector, and the other of a prosperous, well-dressed citizen of the present day. Among the attractions are also petrified woods from the neighborhood of Sioux Falls, and a tower of Portland cement from a Yankton manufacturer.

The Kansas section in the north of the hall corresponds to that of Iowa in the south, but is of smaller extent. Briefly, lead and zinc ores, metallic lead and zinc, rock salt and gypsum comprise the exhibit, among which are several fine specimens of galena lead, displayed at the entrance-way. Among the collective exhibits in the east gallery are also samples of Kansas cement, and of golden ochre from the Saline river.

The most striking feature in the section allotted to West Virginia is the exhibits of coal, specimens of which are seen at every hand and in all sizes and shapes. This is as it should be, since, both in actual production and in deposits still undeveloped, the state occupies a foremost rank. As is also evident from this display one of the most prominent industries is the manufacture of coke, while petroleum, both crude and refined, calls attention to another source of wealth. Building stones, fire clays, hydraulic limestone, and glass sand are here on exposition, with a refuse substance from a glass factory known as mineral wool which, in appearance and fire-proof qualities, is little inferior to asbestos. In the picturesque mountains of West Virginia are numerous mineral springs whose waters possess valuable medicinal properties, and of these there are a few samples among the more substantial collections.



COAL FROM WEST VIRGINIA

With the exception of West Virginia, the exhibits of the southern states are installed in the northeastern section of the hall, adjoining the department of machinery. North Carolina has the most elaborate display, and along one side of it are groups of limestone, white, blue, gray, and mottled marble, gray and pink granite, and gray and brown sandstone. In cases arranged along the section walls are many specimens of gold, both free and in the ore, with smaller collections of iron, tin, copper, silver, and coal. Sapphires, garnets, emeralds, smoky quartz, and other gems and crystals are shown, together with such useful products as kaolin, fire-clay, graphite, and talc, the last especially valuable in the manufacture of pencils. In crystalline and silicious forms are numerous

samples of corundum, which serves as the basis of many preparations used by dentists and opticians, and also by workers in metal, for grinding, abrading, and polishing their goods. The mica deposits of North Carolina furnish an interesting collection, and the exhibit is diversified by a number of large photographs displaying various localities which nature has enriched with mineral deposits.

In Virginia's section, one of the most attractive features is the picturesque scenery along the line of the Chesapeake and Ohio railway, depictured in the background. Among the exhibits proper the most remarkable are two large masses of iron ore and coal, the former of which is the nearest approach to steel that nature has made, while the latter is a coking and almost smokeless variety, and combines more desirable qualities than



any that have yet been mined. In the North Carolina collection are specimens of zinc, lead, and tin ores, the ores from which mineral paint is made, and granite, slate, and other building and ornamental stones.

Between the New Jersey and Minnesota pavilions a small section is jointly occupied by Louisiana and Tennessee. The latter presents a few specimens of iron, coal, building stones, and the clays used in the manufacture of bricks and tilings. Louisiana occupies the greater part of the space, and of special interest are the exhibits of chalk kaolin, and the clays used by the potter and the maker of imitation meerschaum pipes. There are also a few samples of iron, gold, and silver ores, of sandstones and whetstones, and of soda and potash; but the most striking exhibits are of fine, coarse, and rock salt, one of them representing a figure of Lot's wife standing in the foreground.

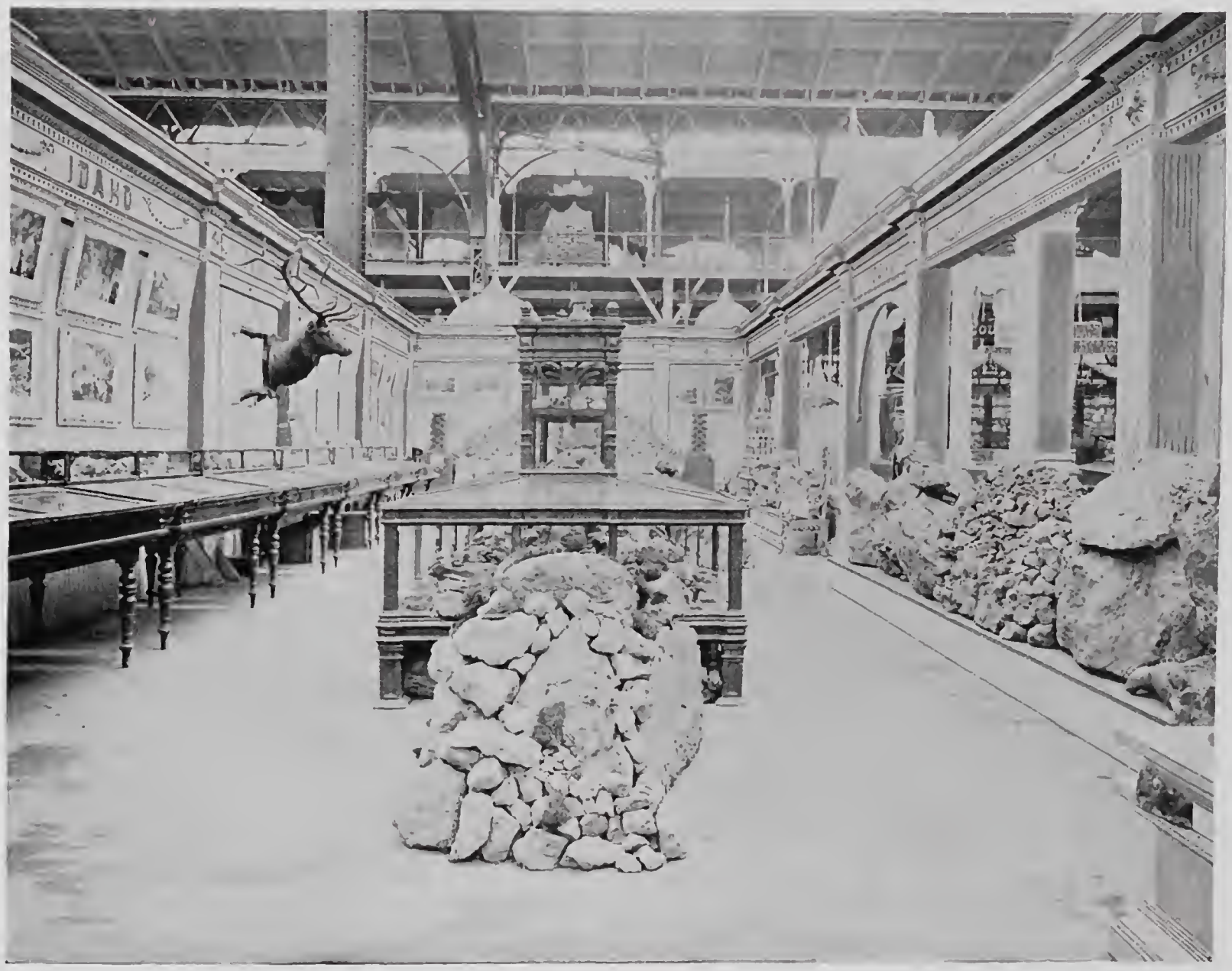
Except for a shaft of semi-bituminous coal at one of the western approaches to the Mining hall, and erected by a manufacturer of mining machinery, Maryland is without representation in this department. South Carolina and Florida find expression in the eastern galleries, especially in their lavish display of phosphates, the one from the Palmetto state being mainly contributed by mining and manufacturing companies of Charleston. Among them is crude phosphate rock, mined both from the river beds and the dry soil, together with strange forms of fossil life. From Florida are also samples of phosphates, both in its crude state and prepared as a fertilizer, the exhibit being arranged in a frame of native woods which shows the geographical outlines of the state.

Before describing the exhibits of the Pacific slope, whence comes our main supply of the precious metals, a few remarks may be of interest as to the relative yield of gold and silver, and the conditions evolved thereby. Of the total output of the United States, amounting for the century ending with 1892, to nearly $2,000,000,000 in gold and $1,200,000,000 in silver, less than one per cent was produced between 1792 and 1847. Then came the discovery of Marshall, who was about to throw away as iron pyrites a handful of what proved to be scales and nuggets of gold, picked up near the historic saw-mill in Coloma valley. In the single year of 1849 more gold was taken from the earth than during the half century which preceded it, production gradually increasing until in 1853 it reached its maximum value of $65,000,000, gradually diminishing to less than $40,000,000 in 1862.



GOLD, SILVER, COPPER, AND LEAD

Meanwhile the Comstock lode had revealed its treasures, and from an average of less than 40,000 ounces for many previous years, the total output of silver rose to 6,600,000 ounces in 1863, gaining in volume, though with many fluctuations, until for 1892 it was estimated at 58,000,000 ounces, for the waning yield of Nevada mines had been more than compensated by the product of Colorado, Arizona, Montana, Idaho, Wyoming, and other Pacific slope states. This was attended with a corresponding shrinkage in value, the price of silver in New York and London falling from $1.14 to 87 cents an ounce, or a decline of some 24 per cent for the decade ending with 1892, and with a still further depreciation in the following year. Between 1849 and 1860 the production of gold in relation to silver was in the ratio of more than fifty to one in actual weight. Thenceforth these conditions were gradually changed until, for the ten years ending with 1892, there were produced about twenty-five ounces of silver to one of gold, while for the last of these years the proportion was thirty-six to one. Here is the key-note to the silver question; for the precious metals are merely commodities, and like all other commodities, are subject to the inexorable laws of supply and demand. To place a fictitious value on silver is no more practicable than to place a fictitious value on coal or iron, on wheat or pork, and all such efforts can only result in making the United States the dumping ground for the loose silver of the world. Such, at least, are the teachings of political economy, a science the merest elements of which it would seem that many of our law-makers have yet to learn.



WITHIN IDAHO'S PAVILION

Though with a vastly diminished yield as compared with earlier years, California still occupies the foremost rank as a gold-producing state, her output averaging from $12,000,000 to $13,000,000, or more than one-third of the present production of the United States, while of the total yield, since 1848, more than two-thirds must be accredited to the golden state. Of silver her annual product is less than $1,000,000, and has never exceeded that amount. Of quicksilver a considerable amount is produced, the New Almaden mine alone contributing since 1850 more than 70,000,000 pounds. Iron is widely distributed; but can be imported at rates that almost prohibit local development. It was not until 1880 that the first smelting works in California were erected at Clipper gap in Placer county, with a capacity of 15,000



SPECIMENS OF GOLD AND SILVER ORE, IDAHO EXHIBIT

tons a year. Coal, though abundant, is for the most part in narrow seams, of inferior quality, and in localities difficult of access, the only productive veins of importance being near Mount Diablo, within a few miles of San Francisco bay. Of petroleum 8,000,000 gallons were obtained in 1884, and since that date a much larger quantity. The largest works are in Ventura county, whence the crude oil is conveyed in iron pipes to a shipping point on the coast. Asphaltum, formed by the evaporation of the volatile portion of the oil, is also plentiful in several of the southern counties.

Of copper there is enough to supply the demands of the world, but with less than $100,000 worth annually taken from its native gangue. Borax is largely produced in San Bernardino and Inyo counties, from a tract 10,000 acres in extent. In Lake county there are also valuable deposits, together with a sulphur bank, on the eastern shore of Clear lake, where sulphur was first manufactured in 1861. The first bar of tin, fashioned in the United States from native ore, came from a California mine; but, as an industry, tin mining has thus far proved unprofitable. Mineral soap, for which no better name has yet been adopted, was known to exist as early as 1849, and mineral paint has become an article of commerce. Building stone is abundant, a marble quarry in Tuolumne county being worked in 1857, while, near Auburn, in Placer county, is granite of excellent quality. Of mineral springs there are fifty which serve as health resorts, with twice as many more unknown to fame. Among metals and minerals but little utilized may be mentioned saltpetre, asbestos, antimony, platinum, chromium, mica, bismuth, zinc, and iridium. Such are the principal resources of California as a mining region, here mentioned not with intent to give special prominence to that state, but because, as elsewhere on the Pacific slope, these resources, apart from the precious metals, are as yet but little appreciated.

To the Pacific states a liberal space was allotted in the southeastern section of the hall of Mines and Mining, flanked on one side by exhibits of mining machinery, and separated by the central nave from those of foreign lands. In front of the group is the pavilion of the golden state, in which are displayed to excellent advantage her many varieties of building materials. The portal is constructed of various kinds of stone, in the form of a triple arch, thirty-six feet in length, with wings on either side, with base of dark granite and white marble columns from Colton and Inyo quarries. The caps of the columns are richly carved, supporting a handsome entablature, and behind them are pilasters of onyx, beautifully veined. The arches are of grey sandstone, the panels and pediments of variegated marble, and the wings of blue green-stone, nearly all the best of California's building stones, some of them highly polished, being represented in this pavilion.



SILVER AND LEAD FROM UTAH

The specimens gathered during a series of years by the state mining bureau form the basis of the exhibit, and to these were added contributions from private collections, forming together a valuable assortment of economic minerals, some of them almost a novelty to the scientific world. In double rows of show-cases are choice samples of gold and silver ores, containing some $20,000 worth of metal, and representing all the more prominent mines. Here also is the metal itself in various forms; but the centre of interest in the California section was the historical nugget which Marshall picked up from the Coloma mill-race on a January morning in 1848, the finding of which revolutionized the commercial conditions of the world. This, however, was a treasure presumably of too great value to be trusted by its owner, even under the care of the Exposition authorities, and was removed not long after the opening of the Fair.

Upon the walls and around them are souvenirs and memorials of pioneer days, including a portrait

of Marshall, photographs of hydraulic mining and mining processes and districts, among them Sutter's mill and mine, with the primitive rocker and pan, the mining methods of those days being a cross between Mexican tradition and Yankee ingenuity. In models is illustrated the science of mine timbering, especially as applied on the Comstock lode, in Nevada, in what is known as the crib system of timbering, invented by a German miner and scientist, Philip Deidesheimer by name. When a depth of some 200 feet was reached in the Ophir mine, the ore body was found to be 45 feet in width, thus rendering almost useless the post and cap system before in use, for such would not uphold the roof of the chamber. Then it was that this man came to the rescue, framing timbers in square sets or cribs from four to six in size, piled one upon another, and filled with waste rock, thus sustaining lateral as well as downward pressure. The plan was widely adopted; and but for this or some similar appliance, the deeper workings of the Comstock, which have added nearly $300,000,000 to the stock of precious metals, would never have reached, as later they did, a depth of more than 3,000 feet. In statistical and other forms much valuable information is conveyed, and here not a few among the pilgrims of



the Fair will learn for the first time that of the total yield of gold, amounting since 1848 to $1,900,000,000 for all the United States, California has contributed $1,310,000,000.

Oregon's display, though unpretentious, was somewhat of a surprise to the majority of exposition sight-seers. Coal, iron, and copper were known to exist in abundance; but few were prepared to see in this collection such specimens of gold and silver ores as are here exhibited. Among them are samples of gold quartz assaying several hundred dollars to the ton, one of them from the surface croppings of a recently discovered mine. Nearly all the mineral products of the state are represented, and in a model is shown the process of hydraulic mining. In 1891 Oregon produced more than $1,600,000 worth of gold, and some $300,000 in silver, the former the largest yield recorded up to that date, the principal mines being in the southwestern districts where the veins are small but rich. Since, in 1855, the first cargo of coal was shipped to San Francisco from the Coos bay mines, these beds have been worked without intermission, the maximum yield of 82,000 tons being reached in 1887, while the gradual decrease to 35,000 tons in 1892 was due only to low prices and labor troubles; for the deposits are practically inexhaustible. In few sections of the United States are iron ores more widely distributed or more advantageously located, the Oswego works furnishing this metal to Oregon and California foundries for more than a score of years. Copper ores are plentiful and rich, though as yet but little utilized.

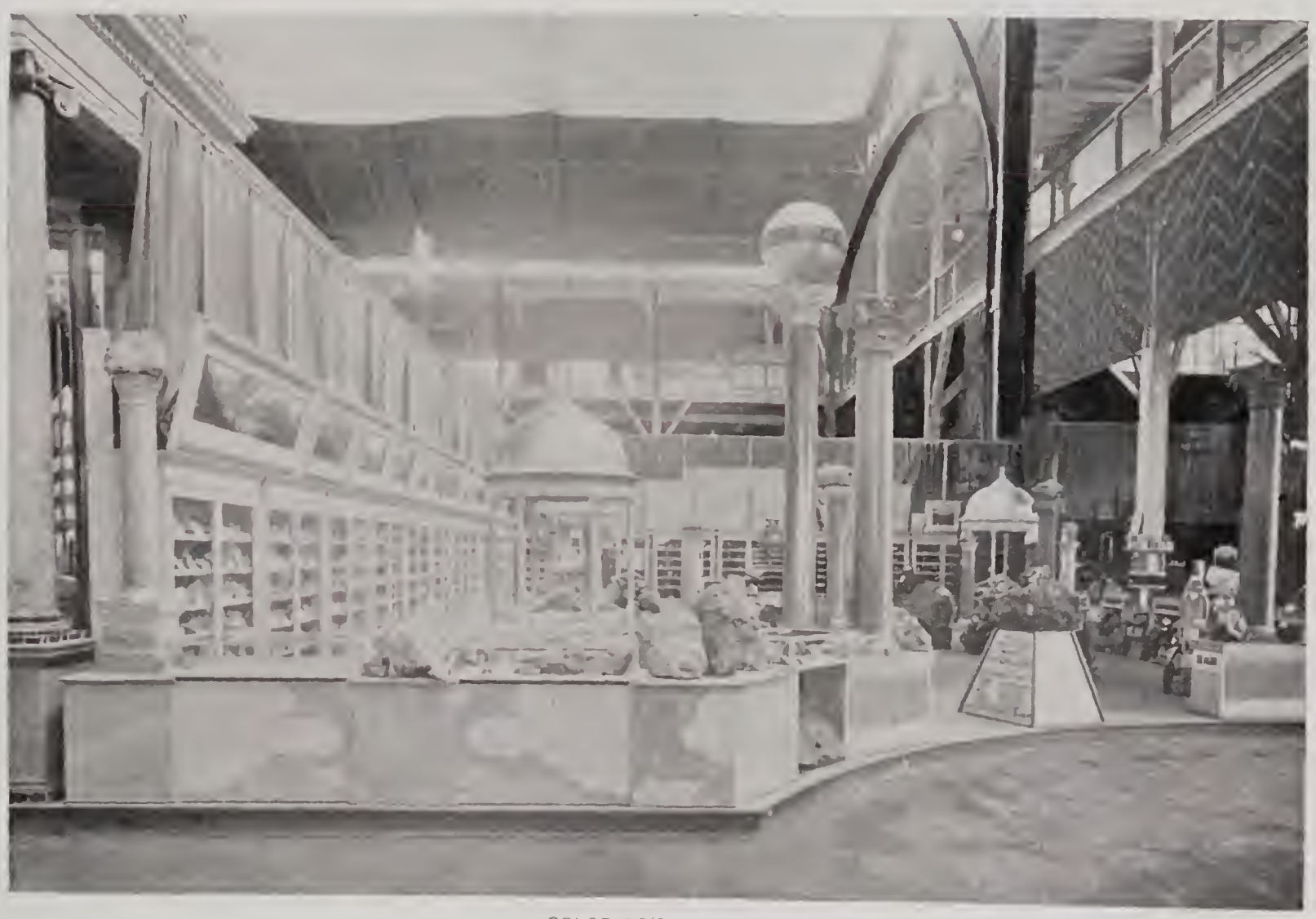


COLORADO EXHIBIT

Of nickel there is in Douglas county one of the largest mines in the world, rivalling the famous deposit in the Sudbury district, in the Canadian province of Ontario. Platinum and iridium are found in connection with placer gold; cinnabar exists in several districts, and with marble, granite, and other building stones, few of the Pacific states are better supplied.

In Washington's tasteful pavilion of terra cotta are 150 tons of mineral samples, gathered from every mine at which samples could be obtained. Among them are gold, silver, iron, lead, and copper ores; with coal, granite, marble, and onyx; sands and clays; bricks, tiles, and terra cotta; thus representing the principal mining resources and industries of this young and ambitious commonwealth. Here also, or in the state pavilion, are reproduced in models or in graphic art several of the more prominent mines, with the mountains and ravines in which they were discovered, with assays, statistics, and other information conveyed in attractive form. In the centre is a monument composed of gold, silver, lead, and copper ores, the shaft entirely of silver specimens, and around it groups of minerals in various designs. Near by is an ornate structure of similar materials, with a large mass of magnetic ore. The entire display is a credit to the evergreen state, which, to add to its attractions, purchased a number of gold nuggets, and even constructed roads to remote districts where contributions had been promised.

In comparison with other metals and minerals, Washington's yield of gold and silver is inconsiderable, the latter amounting for 1891 to less than $600,000. During the régime of the Hudson's Bay company coal was discovered in the Cowlitz valley. In 1852 deposits were found on Bellingham bay, and between 1860 and 1879 produced at the rate of 13,000 tons a year. Meanwhile more valuable beds had been disclosed, and the total output gradually increased to its maximum of 1,264,000 tons in 1890, the yield for 1892 being estimated at 900,000 tons. The entire area of coal lands has been stated at 180,000 acres, most of it within 40 miles of tide water, a single company owning claims on the Squak river two miles in length, with veins occurring at intervals from five to twelve feet in thickness, and said to contain 10,000,000 tons of merchantable coal. Bog-iron ore is abundant, and in Iron mountain, near the Snoqualmie pass, are veins of magnetite from 50 to 150 feet in thickness. On Kettle river are copper ores assaying from 50 to 75 per cent, all these and other resources as yet almost untouched.



COLORADO'S PAVILION

Turning to the adjacent state of Idaho, we find that her yield of the precious metals was estimated for 1892 at 90,000 ounces of gold and 3,250,000 of silver, the latter the smallest output in several years, due to extreme depression in prices, and to labor troubles in Cœur d' Alène, the principal argentiferous district. From the low-grade galena ores of this district, occurring in veins of considerable width, and with no indications of failure as depth is attained, were extracted in 1891 nearly 2,000,000 ounces of silver, and



NEW MEXICAN MODELS

copper ores of the Bear lake district assay as high as 75 per cent. of sulphur, much of it containing 70 to 80 per cent of mineral, and at the Oneida salt works a marketable quality of salt is produced by simply boiling the water of springs in galvanized iron vessels. In northern Idaho there are mica, marble, granite, and sandstone, and almost throughout the entire country metals and minerals of economic value are widely distributed.

First among the hundreds of exhibits contained in Idaho's classic pavilion, colored in white and gold, may be mentioned that of the state, including, among others, samples of gold, silver, and copper ores, cinnabar, building stones, and clays, quartz crystals, sapphires, amethysts, and ruby sands. From nearly all the more prominent mines contributions were secured, each county being thoroughly canvassed, and with the result that nearly 2,000 samples were forwarded to Jackson park in several car-loads. Not a few of these are contained in the 2,500 cabinet specimens, selected by an expert, who also states the name of the mine and its owner, the assay value of the ores, the depth at which they were obtained, and other information of interest to mining men.



MONTANA'S SILVER STATUE OF JUSTICE

66,000,000 pounds of lead, Idaho ranking next to Colorado in production of the latter. Says one who has made a careful study of her mines: "Cœur d' Alène is most favorably situated for producing lead, the silver being almost a by-product. The ore is cheaply worked, and numerous streams afford ample water power. These mines can be operated at a profit with the price of white metal so low that others are compelled to shut down."

Apart from the precious metals, Idaho has an abundance of coal, iron, copper, sulphur, and salt. From the Narragansett mine in Owyhee county iron ores have been taken so rich in metal as to be cast into dies for stamp-mills, and elsewhere are veins which yield from 50 to 60 per cent, while the Near Soda springs is an immense deposit



Gold and silver are freely displayed in the Idaho section; the former in the shape of nuggets from private cabinets, some of them found in the placers worked in pioneer days. Of wire silver there are beautiful specimens, delicate threads of pure silver, resembling filigree work, clinging tenaciously to bunches of galena ore. Among the exhibits are two rectangular blocks of what appears to be lead bullion, but is in fact galena ore, containing 75 per cent of lead, 15 of sulphur, and 130 ounces of silver to the ton. Of palladium ore there are samples from the Esmerelda mine in Lemhi county, where it is found in bunches yielding two or three ounces to the ton, in combination with free milling gold. This rare and valuable metal possesses the hardness of the finest steel, and is used, among other purposes, for astronomical, surveying, and electrical instruments, the main



MANUFACTURES AND GOVERNMENT BUILDINGS FROM THE LAGOON

supply coming from South American countries.

Of pure aluminium there are samples extracted from the clay banks of Kootenai county, said to contain more than forty per cent of the metal. Among valuable stones are the onyx and opal, the latter found in a recently discovered mine on the banks of Snake river, and taken from matrices several inches in width. From Lewiston comes a specimen of rock almost unknown to scientists, of variegated tints somewhat resembling jasper, and one that will cut glass more readily than a diamond. Iron and copper ores are in liberal supply, and a large case is filled with samples of lead and copper concentrates; of granite, marble, and alabaster there are several exhibitors, and of asbestos there is a sample from Owyhee county, where a deposit was found in the autumn of 1892. Finally there is a large collection of mineral waters, in which, as in other resources, Idaho is especially rich, awaiting only the means of transportation for their fuller development.



MONUMENT OF GERMANIA IN PORTLAND CEMENT, MANSKE EXHIBIT



Except for Alaska, whose yield of gold already exceeds $2,000,000 a year, and with one of the largest gold quartz mines in the United States—the Treadwell lode on Douglas island—with immense deposits of low grade but dividend paying ore, Nevada is the only section of the Pacific slope that is not represented among the main exhibits of the Mining department. And yet, not many years ago, Nevada was the largest silver producing region in the world, the bullion product of the Comstock mines alone amounting to $350,000,000, and for the single year of 1876, when the maximum was reached, to more than $70,000,000.

Utah has some 300 exhibits of gold, silver, silver-lead, copper, zinc, iron, and other ores, with building stones, coal, antimony, quicksilver, sulphur, salt, asbestos, and other metals and minerals, all neatly arranged and fairly representing the abundant mineral resources of the territory. In iron Utah is especially rich, with surface deposits in Iron county alone estimated at 50,000,000 tons, one of them a solid mass of magnetic ore, 1,000 feet long and half that width, from which analyses show from 60 to 65 per cent of metal.

Of the 163,000 tons of copper obtained from domestic ores in 1892, more than one-half came from Montana, whose yield for that year was 82,150 tons, against 53,700 tons for Michigan mines. Of this enormous output, the largest thus far on record for a single state, 50,000 tons came from the Anaconda company's works, whose property includes, besides the mine of that name, the St Lawrence and the so-called Chambers Syndicate mines. Of the precious metals Montana is also one of the largest producers, her yield of silver exceeded only by that of Colorado. Of gold, silver, lead, and copper her total output for the decade ending with 1890 was estimated at $250,000,000, of which more than two-thirds consisted of gold and silver. In that year was claimed for this state the largest gold mine, the largest silver mine, and the largest copper mine in the country, and in the following year the volume and value of mining products were the largest yet recorded.

Of the several hundreds of exhibits displayed in the Montana section, more than sixty consist of copper and silver-copper ores, both metal and mineral being displayed in every phase of production from sulphides



MEXICAN ONYX

and matte to sheet, tube, wire, and other manufactured forms. Of silver, gold, and silver-lead ores thousands of specimens are exhibited by more than 400 contributors. There is also the largest collection of nuggets contained in the Mining hall, one of them weighing nearly 48 ounces, and with 96 per cent of pure gold. Near it is a display of gold crystals, sapphires, and garnets from El Dorado bar on the Missouri, and within a few miles of Helena, and in another case are trays of gold-dust from the placers, each one holding about $1,800 worth of metal. Of coal there are many samples, and the building and other stones and minerals of economic value include granite, marble, porphyry, limestone, clays, gypsum, sulphur, graphite, and asbestos.



FOREGROUND OF THE STUMM EXHIBIT

The state has a large and valuable collection, among which are silver, silver-lead and iron ores, and surface copper; marble and other building stones; yellow and red ochre, manganese, malachite, chrysolite, tourmaline, dendrites, stalactites, rhyolite, rose and agatized quartz, garnets, jasper, and chalcedony. In a tin brick weighing some thirteen pounds, made by the students of the college of Montana, is represented the yield of that metal for 1892. Another curiosity is an old wooden cam which did service in 1864 at a four-stamp mill on Grasshopper creek, in the Bannack district, where two years before were discovered its placers and quartz ledges.

But the centre of attraction in Montana's beautiful pavilion, at the entrance of which stands a case of specimens from the Elkhorn district, is the statue of Justice, fashioned of native silver, and with orthodox scales and sword. In this statue, placed under a canopy of maroon velvet, in the centre of the pavilion, and guarded by two bronze lions, was used nearly a ton of sterling silver, the figure resting on a silver globe, beneath which is an eagle with outstretched wings. The lower portion of the pedestal is of ebony, and upon this is a plinth of pure gold, more than two feet square, and representing, as is said, a value of $250,000. The model selected for this, the largest silver statue in the world, was the actress Ada Rehan, whose stately and opulent form is cast in heroic mold. Behind the statue is a structure fashioned of copper bars; on the walls the more prominent mining centres are reproduced in photographs, and at the back a painting, named A Good Strike, represents the scene which its title indicates.

Colorado is well represented, as befits a state which in 1892 produced $5,500,000 in gold and more than $30,000,000 in silver, taking the lead of all other sections in her output of the precious metals. Of coal the production increased from 4,500 tons in 1870 to 3,800,000 tons in 1892; of iron the yield for the latter year was 32,000 tons; of lead, 61,000, and of copper 3,600 tons. Add to this her wealth of building and other valuable stones, her carnelian, chalcedony, onyx, jasper, jet, and agate; her petroleum deposits, almost rivalling those of Pennsylvania, and already producing at the rate of several millions of gallons a year, and it will be seen that Colorado is not wanting in mineral resources.

The section allotted the centennial state, adjacent to the southern portal of the building, is faced along the aisles with marble, and on either side of the main entrance are polished granite pillars with capitals of red sandstone. Within is a circle of columns fashioned of various building stones, and a pillar of granite surmounted by a globe, and a massive coal trophy, eight feet square at the base and twenty-four in height, dominate the entire display. Two sides of the structure are lined with cases filled with specimens of ore, and masses of gold and silver bearing quartz are grouped along the aisles, while in the centre, wire, nugget, placer, and other forms of gold from the Breckenridge district are freely displayed, together with gold and silver roses from a Denver exhibitor.



GERMAN WIRE CABLE

Among the many thousands of cabinet specimens contained in this collection, including those in the gallery, a large proportion was furnished by the state school of mines at Golden, and from the Colorado scientific society are samples of eruptive rocks and meteorite, forming together a most valuable and comprehensive assortment. From the more valuable mines there are also contributions, and from business, manufacturing, and other firms and companies are exhibits of coal, coke, iron, marble, building stone, slate, clay, asphaltum, petroleum, mineral waters, and other products, together with smelting and refining processes. Above the cabinets are photographs of the principal mining regions, and of buildings fashioned of Colorado stone, while in map form are depictured the geological and topographical features of the state.

From Aspen come samples of silver ore that average from 70 to as much as 20,000 ounces to the ton, the latter rather an exhibit of metal than of metal bearing rock. From Leadville are also some high grade specimens from the Chyrsolite mine, especially of bromo-chlorides; Forest city sends carbonates that assay 2,500 ounces, and the Lion mine carbonate ores almost as valuable. Of auriferous ores there is also a large collection, including ore from the Elkton mine containing more than $7,000 to the ton in free gold; from the Blue Bird mine telluride which yields up to $1,200 a ton, and others whose average varies from $7 or $8 to $1,100. Of turquoise there are beautiful specimens from the Blue Gem mine at Villa grove, and in a word nearly all the minerals of economic value contained in the centennial state are here on exposition.

Arizona's exhibits, adjoining the Colorado section, are displayed to excellent advantage on a raised platform, in the centre of which is a monument of copper ore, in rich colors of blue and green, one of the



specimens of which it is composed weighing nearly 7,000 pounds, and the smallest exceeding 800 pounds. Around it are cases of cuprite, azurite, malachite, and other minerals of brilliant hue, some of the samples from the Holbrook mine, where is a cave of stalactite, being covered with incrustations of silver. In blocks of ore assaying from 30 to 70 per cent are represented all the more prominent copper mines of Arizona, whose total yield for 1892 was estimated at 19,000 tons. The metal itself is shown in the form of bricks, bars, sheets, rolls, plates, wires, and all other forms in which it is manufactured, and from one of the exhibiting companies are models of its mines and apparatus.

Of gold and silver ores and ores of silver and lead there are nearly 100 exhibitors, one piece of gold ore assaying a dollar to the pound; and from Cochise county, which furnishes the bulk of the collection, are a few gold nuggets, and a sample of onyx nearly eight feet long by two in width; while Mohave county, which is also well represented, presents specimens of agate and silver glance or sulphurets. Sandstone of finest grain is shown in the form of slabs and pillars, and there are portions of petrified trees, some of them beautifully polished.

Almost in the centre of New Mexico's section is a structure composed entirely of native ores in the form of a miner's cabin, and near it are relief models of several prominent mines. Beyond are pictures of the typical miner in orthodox costume, and with his patient and long-suffering burro. Here and in the western galleries is a large collection of minerals, including all the varieties discovered since, in 1832, were extracted from the so-called old placers a few thousand dollars worth of gold. Nearly all the metals common to the Pacific slope are contained in these sections, the greater number of the exhibits consisting of gold, silver, silver-lead, and copper ores; while coal is represented in the form of a pyramid, its materials furnished by the Madrid mines, the property of a railway company.

Coal is the feature in Wyoming's exhibit, representing an industry whose output for 1892 was 94,000 tons. Iron and copper are widely distributed; but neither have been as yet extensively worked, though in Albany county is a mountain of ferruginous rock assaying as high as 80 per cent of metal. Petroleum is found near the surface in many localities; near Laramie is a large deposit of mica; building stone is abundant; agates, amethysts, and other valuable stones have been found in the valley of the Sweetwater river; plumbago and graphite, soda, sulphur, asphaltum, and asbestos are among Wyoming's minerals, and the precious metals are found in many portions of the state. All these are represented in her pavilion, in which the central point of interest is a shaft of coal from the Black hills mines, most of the material furnished by the Union Pacific Coal company's works at Rock springs. The Wyoming Railway and Iron company has a large collection of ores; asphaltum is freely displayed, and in glass tubes are the various grades of petroleum manufactured by the Black Hills Oil company.

In addition to those already mentioned, California, New Mexico, Nevada, and Colorado have exhibits in the northwestern galleries, consisting principally of cabinet specimens, covering the entire field of their mineral wealth. Nevada, to which no space was allotted on the ground floor, occupies the largest area, the White Pine district making an elaborate display. In quartz crystals and ornamental stones the collection is especially rich. The Gunnison region of Colorado sends many specimens; but the feature in this section is the heroic figure of the Silver Queen of the World, seated in a triumphal car of silver, the canopy overhead and the foundation upon which it rests being richly encrusted with powdered crystals. This foundation serves as the entablature of several marble pillars, those at the main entrance being arranged in pairs. Cupids precede the chariot, scattering as they run disks of gold and silver, each piece as it falls from their cornucopias displaying the watchword, Free Coinage. Beneath their feet and upon the front of the structure are skilfully fashioned in mineral substances the words, Aspen, Colorado; and specimens of ores and gems are tastefully displayed.



ENTRANCE TO ONTARIO EXHIBIT

First among the exhibits of foreign participants may be mentioned Germany's elaborate display, one in which are fully illustrated the mining and metallurgical industries of an empire which ranks first among the continental nations of Europe, her volume and value of production exceeded only by that of England and the United States. Of gold and silver extracted from native ores the yield is inconsiderable; but from imported ores there were produced in 1890 several thousand pounds' weight of gold, and of silver, in connection with the smelting of lead and copper, more than 400 tons. Of coal the German output for 1892 was 71,000,000



CANADIAN NICKEL ORE

tons; of pig iron, 4,900,000 tons; of sulphur and sulphuric acid, 437,000; of zinc, 140,000; of lead, 98,000, and of copper, 25,000 tons; these representing the principal economic minerals whose product was valued for that year at about $225,000,000. Copper is largely imported, the only important deposit being a vein of cupriferous schist in the Mansfield mines, of inferior quality, but largely utilized through elaborate mining processes; for the Germans have no superiors as metallurgists, the inception of this science dating far back to the prehistoric era of the fatherland, and in the middle ages attaining a higher development than elsewhere in the world.

The German exhibits are divided between the ground and gallery floors, the latter containing chiefly such as pertain to metallurgy and mining processes and apparatus. A considerable portion of the ground floor space is occupied by the Stumm pavilion, at the entrance of which is a massive iron gateway, surmounted by the heroic figure of a blacksmith, with fire-breathing dragons at his feet. Within is a large metal basin, on which are the brawny figures of workers in iron, assisted by sturdy lads, one of whom is helping to grasp with his tongs a bar just issuing from the roller, while the other is pushing a cart filled with molten ore. Above this group is a bust of Baron Stumm, the founder of the works from which it came, the Vereinigte Eisenwerke of Neunkirchen, one of the largest of Prussian foundries, employing several thousand hands, and producing an enormous quantity of manufactured iron. Among its exhibits, which form one of the most imposing collections in the hall of Mining, is a portico of cast iron pipes, flanked by obelisks of rolled and forged iron, the metal being displayed in many structural forms, including coils of wire towering like some huge tropical plant, almost to the roof of the building. In the background is a terrace of rails, and above it a cold-bent specimen, stretching in serpentine form along the rear walls. Here also is reproduced the iron superstructure of the Gotthard railway station, and near by are models of the mills and the dwellings occupied by mechanics.



MICA AND LIME

Near the southern portal of the hall, not far from the Colorado section, is an imposing structure composed of seamless steel tubes, erected by the Mannesmann works of Berlin. The exhibit consists of tubing for boilers and pipe lines, whether for oil, gas, water or steam, and hollow tapered poles for telephone, telegraph, electric light, and electric railway purposes. The special feature in these articles is that all are rolled from solid blocks by a patented spiral process, which causes the fibres to twist into a rope-like and extremely tough material.

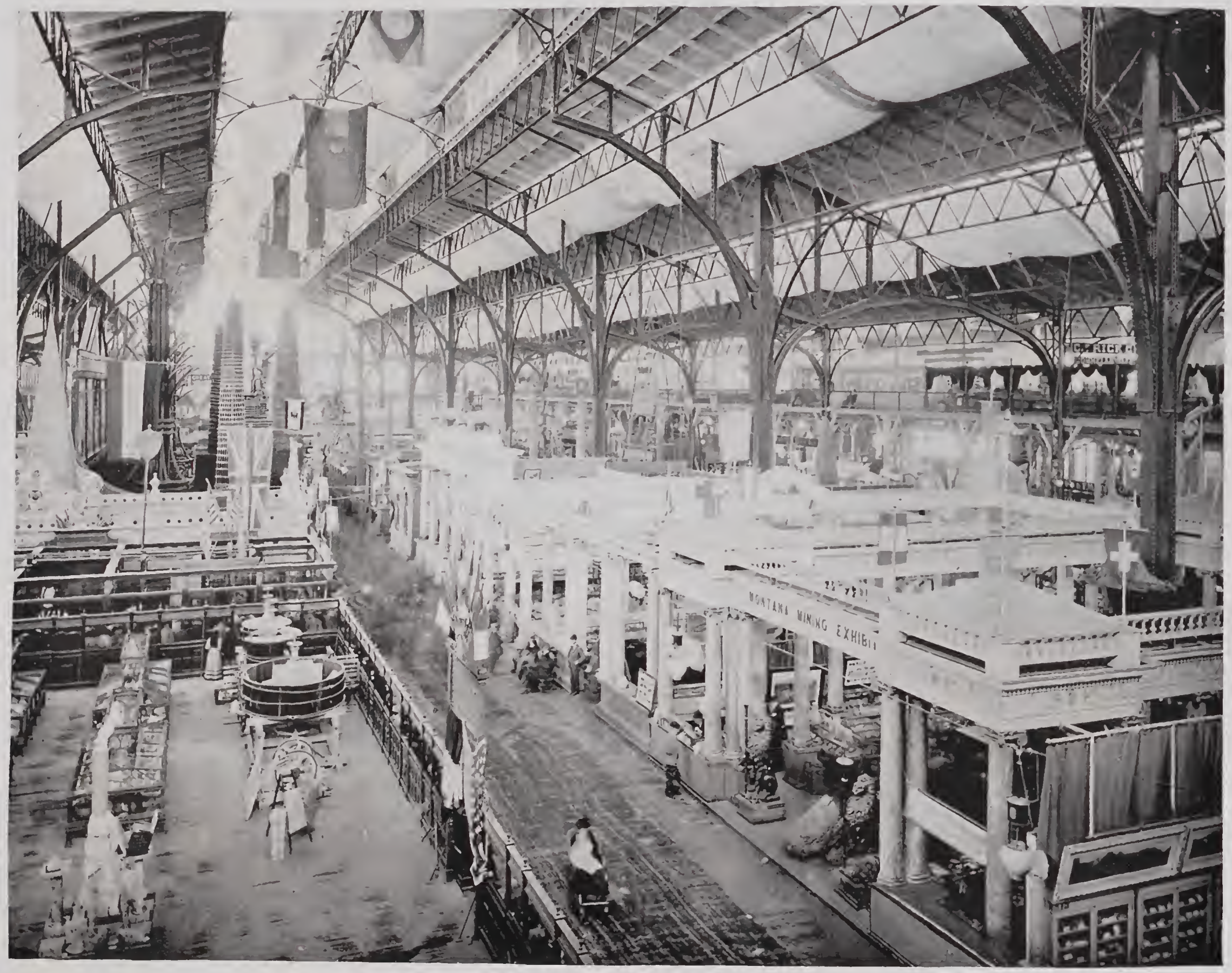


BRITAIN'S TROPHY OF COAL

Elsewhere in Germany's section are specimens from her quarries and coal mines, with coal tar, oils, and paraffine, graphite and its products, and ornamental specimens of zinc. A Heidelberg firm has erected an elaborate structure composed of cement and gravel, though seemingly fashioned of limestone of a bluish tint. At the entrance is an archway with female figures in classic pose. Of cements there are several exhibits, and in the display of a Berlin laboratory are machines and apparatus for comparative tests of this compound, especially of the Portland variety, the experiments conducted in accordance with regulations framed by the government. By the Lehrte and Misburg firm of Manske and company was erected, near the live-stock pavilion, a portal of artificial sandstone, on which is a heroic statue of Germania, its flooring and stairway made of slabs of cement, and with piles of casks containing the manufactured article.

In the gallery the German division is in compartments, in one of which is a tall gilded shaft, its face

representing in sections the relative yield of mineral products. Amber is freely displayed, and in many of the specimens are imbedded various forms of insect life. Other attractions are a tower of iron ores, a model of the Royal Prussian salt-works, and a scientific collection of crystals, with models of crystalline forms, showing geometric figures in different minerals and their interior lines of contact. But the feature of the gallery groups is the models of mines, illustrative of processes and apparatus, and especially of coal mines, by which are produced so large a proportion of the mineral wealth of the empire. The last are contained in the general exhibit of Prussian mining, some of them showing the method of wetting the face of the works so as to prevent the spread of fire-damp. Here also is shown a coal dressing plant at the royal mines at Saarbrück, with a drift run in the König colliery to test the use of explosives in the presence of fire-damp.



UNITED STATES SECTION—MEXICAN AND GERMAN EXHIBITS TO THE LEFT

Coal and iron are the principal mining products of the British isles, the value of the former being more than six times that of the latter even in metallic form, while the annual yield of pig and bar iron represents nearly 90 per cent of the total value of all metals produced from native ores. In 1891 there were extracted 185,000,000 tons of coal, worth $350,000,000, and giving employment directly to 650,000 miners and laborers; of iron ore nearly 13,000,000 tons were worked into $58,000,000 worth of metal; of lead the output was 32,000 tons; of tin and zinc, each about 9,000, and of copper only 700 tons. The last of these metals is now almost entirely imported, its production steadily decreasing since 1855, in which year the production was 21,000 tons. Meanwhile the steadily increasing yield of the United States, Chile, Australia, and other countries had diminished the price by nearly 60 per cent; this, with the gradual exhaustion of the larger deposits, causing a virtual cessation of copper mining in Great Britain. Of iron the production also shows a decrease of about 20 per cent within the last fifteen years, and with a more serious decline in value. Of non-metallic minerals apart from coal, and consisting mainly of building and other stones, clays, gypsum, salt, and oil shale, the yield may be estimated at $70,000,000, and the entire mineral yield of Great Britain is not far short of $450,000,000. Silver, found in combination with lead ores, is produced at the rate of 200,000 or 300,000 ounces a year, and of gold a few hundred ounces have been taken from low grade deposits in Wales, while from a mine in Wicklow county, Ireland, have come a few ounces, costing perhaps fifty times their value to extract.



PRINCIPAL ENTRANCE TO SECTION OF NEW SOUTH WALES

First among the British exhibits may be mentioned the large collections of minerals, somewhat too widely scattered around the pavilion, but representing together all the minerals of economic value found in the United Kingdom. Among them are many specimens of interest to the scientist, as of the blue-ball clays used for a century or more in the manufacture of the finest descriptions of earthenware; flint and flint implements such as Britain has produced from time immemorial, jet from jet shale in Yorkshire beds, and auriferous quartz with its encasing rock from North Wales. The processes of smelting lead and copper ores are shown in samples from metallurgical works, the former both by reverberatory and blast furnace methods, and the metallurgy of nickel is displayed in samples from a Birmingham establishment, while Sheffield and Bradford firms show how steel and iron are wrought into various forms.

Among the blocks of coal is one second only to the Washington specimen, contained in her state pavilion and presently to be described, the former weighing more than 28,000 pounds and containing 350 cubic feet. Of building and ornamental stones there are slate and granite, the latter in many shapes, as polished columns, monuments, crosses, and concrete paving blocks, with porphyry from ancient Egyptian quarries worked by a London firm as concessionaires. Another group consists of Portland and other cements, limestone, and artificial stones. Fire clays and fire bricks are freely exhibited, as also are kaolin and fuller's earth in its crude and manufactured state. Iron, copper, lead, cobalt, antimony, manganese are among the samples in the collections above referred to, and elsewhere are salt in display and decorative forms, and an assortment of grinding, abrading, and polishing substances and apparatus. While in some respects a creditable exhibit, the British section does not worthily represent the great variety and volume of the mineral products of that country.



MINERAL MONUMENTS OF AUSTRALIA

To much better advantage appears the dominion of Canada, in her ample space to the north of the British division, and extending thence beneath the gallery floor. First among the exhibits may be mentioned the collections of the Geological and Natural History survey at Ottawa, and of the several provincial governments, including British Columbia and the Northwest territories. In these are included all the economic minerals contained in the dominion, some of them here for the first time placed on exposition. From the Sudbury district in Ontario comes an ingot of pure nickel weighing 4,500 pounds, with ores and mattes sufficient to give color to the superintendent's opinion that nickel will take the place of tin in the manufacture of household utensils. The ores are mainly of the pyrrhotite description, and of these there are samples from other Ontario mines. Of gold and gold bearing rock the

province sends many specimens, most of them from her government collection, and of native silver, silver ores, and argentiferous galenas the exhibits are almost as numerous. Of platinum there is a small display, and of antimony a single specimen from a vein where it is found in combination with silver, lead, and sulphur. There is zinc blende from the Thunder Bay district on the northern shore of Lake Superior. Iron in the form of magnetites, hematites, bog-iron, and magnetic iron sand comes from several score of deposits.



IN THE FRENCH SECTION

Copper and copper ores and pyrites are in plentiful supply, the largest mass being of copper-nickel ore, weighing 12,000 pounds, and forming, with other blocks of copper and nickel bearing rock, a trophy display from the Canadian Copper company. There is a profusion of building and ornamental stones, of clays, marls, and kaolin; of graphite, steatite, actinolite, and molybdenite; with salt, gypsum, quicklime, and hydraulic cement. Apatite, or phosphate of lime, is prominent among the group of fertilizing substances. The Imperial Oil company has a large assortment of petroleum and its products. Asbestos is a feature in the Ontario section, as also are the sheets of mica and the delicately tinted variety known as amber mica, of which there is a crystal weighing 400 pounds from the Godfrey mine in Frontenac county, where in the Sydenham district similar crystals have been found six feet in diameter and with a weight of several tons.

In the exhibits of other provinces those of Ontario are in a measure duplicated. Quebec's collection rivals that of the sister province, especially in the display of asbestos, mica, plumbago, phosphates, building stones, and iron ores, the last from the Canada Iron Furnace company of Montreal. Among New Brunswick specimens are red granite, freestone, and other building stones, with gypsum and plaster. In the Nova Scotia department are many samples of gold and gold-bearing ores, some of the latter assaying many thousand dollars to the ton. In the central court of the Canadian section is displayed in pyramids of gilded blocks the yield of gold in the several provinces since first it was discovered in British Columbia. Here is represented the output of that province, amounting since 1858 to more than $53,000,000, with a production since 1862 of about $9,000,000 from the Cambrian rock formations on the eastern coast of Nova Scotia, and smaller amounts from Quebec, Ontario, and the Northwest territories, the last producing only since 1889. In numerous samples Nova Scotia shows her wealth in coal, for here are some of the largest carboniferous deposits in the world, one of the mines running far under the bed of the Atlantic, and with seams of extraordinary richness. British Columbia and the Northwest have also many specimens of bituminous and anthracite coal, and from the latter are samples of coal tar, petroleum, clay, and building stone. Finally there are shown in topographical and geological charts, in sectional maps, in photographs and drawings, the locations of mineral regions, together with the more prominent mines, their workings and processes.

With all her wealth of resources, it is somewhat remarkable that Canada imports more largely than she produces of minerals and their manufactures. First on the list of her products is coal, of which 3,400,000 tons were extracted in 1891, and next in the order named, in relative value, are copper, gold, petroleum, asbestos, iron, and silver. For that year her mining output was estimated at $20,400,000, against $25,000,000 of imports, the latter mainly in the form of manufactured iron and steel, which alone amounted to $14,000,000. Ontario is especially rich in minerals; and here have been recently discovered immense deposits of nickel, especially in the Sudbury district, whence, though the ores are of low grade, yielding on an average less than three per cent, $2,700,000 worth of that metal were exported in 1891. Of iron, chiefly in the form of magnetites and hematites, and in quality equal to the best of Sweden, there are large and valuable strata. Coal is widely distributed throughout the dominion, the area of coal-bearing lands in the Northwest territories alone being estimated at 65,000 square miles.

From the far north let us turn to the great southern continent, where beneath the



METALS AND METAL WORK

Southern Cross is a land abounding in mineral resources. As in other departments of the Fair, New South Wales is the only Australian colony represented in the mining division, but in this section is fully illustrated the mineral wealth of a country which has thus far produced a larger amount of gold than all the United States. Since, in 1851, a luckless prospector, observing that the California placers were found amid geological formations closely resembling those which he had seen in Australia, and taking ship for that country straightway discovered gold, the southern continent has added more than $1,600,000,000 to the world's stock of the precious metals. Victoria is the largest producer, her total yield up to the close of 1892 being estimated at $1,300,000,000, and of the remainder nearly $200,000,000 is accredited to New South Wales, whose output gradually diminished from $56,000,000 for the decade ending with 1860, to less than half that amount for the ten years ending with 1890. The discovery of large silver deposits in the latter colony is of comparatively recent date, and yet from a single district were extracted in 1892 nearly $12,000,000 of that metal, with more than 40,000 tons of lead.



COAL AND COKE

By visitors of all nationalities it is conceded that the exhibits of New South Wales form one of the most interesting and comprehensive collections in the hall of Mining, far surpassing those of Great Britain and other countries whose appropriations were of much larger amount. In several thousand packages were forwarded hundreds of tons of specimens, consisting largely of gold in every conceivable form, but including also many samples of silver and silver ores, of coal, iron, copper, lead, antimony, bismuth, and cobalt, with building, ornamental and precious stones, mineral paints, petroleum, cement and lime, and diamond-bearing earth.

At the entrance of the pavilion, fronting on the central nave and north of the Canadian section, is a pillar of frosted silver from the Broken Hills Silver Mining company, whose veins bid fair to rival the far famed lodes of Potosí.[1] The shaft is festooned with garlands and surmounted by a figure of Atlas, supporting his customary burden, with masses of ore at its base, and on one side minor structures of copper, tin, antimony, and silver. From the government collection are silver ores and blocks, and in a nugget of virgin gold is represented $6,000 worth of that metal, with gold quartz assaying 258 ounces to the ton. To the exhibit of private stones there are contributions from several private collections, and of special value is the display of opals.

In the background of this section are inscribed on a lofty wall statistics as to the mineral yield of New South Wales. Here the visitor may learn that this colony has produced gold to the value of $187,000,000; silver and lead, $54,000,000; coal, $124,000,000; tin, $46,000,000; copper, $29,000,000; iron, $1,800,000; and petroleum and other mineral oils, $6,000,000. Add to these the value of other products of the mine, and we have a total yield of at least $500,000,000, for a country whose population in 1892 did not exceed 1,200,000 souls.

Beneath these figures are pillars of various minerals, one of them in the form of a vertical section of kerosene shale. Coal is liberally represented in columns, blocks, and smaller specimens, and in diagram form are shown the thickness of seams and geologic formations of the more prominent districts. Elsewhere are tin, copper, antimony, bismuth, mercury, and iron ores, some of them arranged in structural forms, with ingots and bars of tin and copper, and specimens of the tin-bearing granites of New South Wales, which closely resemble the Cornish formations on the southwestern coast of England, whence tin was extracted long before Boadicea did battle with the Roman legions. Building stones are freely displayed, as also are clays and bricks, and in the form of an entrance way are specimen blocks of colonial marble.



SPECIMEN OF DOMESTIC ORE

Though as a mining country France does not compare with Great Britain or Germany, her production of metals and minerals is very considerable, the yield for 1892 being valued at more than $90,000,000. Of coal the output for that year

[1]Between May 1886 and May 1892 there were taken from the most productive of the Broken Hills mines 36,500,000 ounces of silver and 150,000 tons of lead, some of the ore assaying many thousands of dollars to the ton. Meanwhile more than $1,300 a share had been distributed as dividends and bonus on stock on which only $45 a share was paid up, thus giving a net return of over 3,000 per cent on the invested capital, probably the largest recorded in the history of silver mining.



ALONG THE SOUTHERN SHORES OF THE WOODED ISLAND

was estimated at 26,000,000 tons, and yet with imports of 10,000,000 tons, thus making an average consumption of nearly a ton a year per capita of her population. Of pig iron the annual product is about 2,000,000, and among other metals the largest yield is of zinc, lead, and copper, with a few kilogrammes of gold and a large amount of silver from imported ores.

The French section is adjacent on the north to that of New South Wales; a feature of it is an exhibit from what is claimed to be the only mine in the world which produces pure carbonate of magnesia. Among the more artistic collections are bronzes, enameled tiles, and casts showing the quality of molding sands. Cement is largely represented; a Bordeaux mine-owner has a display of manganese, and a few samples of slate, coal, and patent fuels almost complete the list of what France has to show in the Mining hall in the way of native products. In common with Great Britain and some other foreign participants, France is not worthily represented in this department of the Fair, a large portion of her space being covered by a rustic pavilion, with a group of aquatic plants in the centre, affording a place of rest for weary sight-seers. From the Laurium mines in Greece, controlled by Frenchmen, are massive specimens of silver, lead, and zinc, and from New Caledonia a collection of nickel ores, chrome, and cobalt.



MOULDINGS IN SAND. FRANCE



DESIGNS UPON ITALIAN TILES

In the Austrian section, west of the French pavilion, are several exhibits worthy of note. The mineral waters of Carlsbad are contained in vessels fashioned in the shape of a pavilion, which presents in dioramic form this noted resort, with the lofty mountains that surround it. On the outer walls are depicted in detail the hotels, drinking booths, and architectural features of the place. But it is in iron and steel that Austria makes the best display, noticeable among her exhibits being a hexagonal structure of crucible steel, known as the Poldi variety. The posts, eighteen feet in height, were hammered from ingots, a centre-piece and several cases within representing various commercial forms of the metal, with sections fractured to show the uniformity of the material. Another exhibitor advertises his scythes by cutting sheets of the lightest tissue paper with their keen edges, and on the wall of the aisle is a sheet of iron 160 feet long, a yard in width, and one-twelfth of an inch in thickness, said to be one of the largest plates ever rolled. This, as well as the Poldi steel, comes from Bohemia, whose metal-workers are almost as famous as those who produce the beautiful glass-ware displayed in the hall of Manufactures.



TILES FROM FRANCE

A feature in the Italian section adjacent to the Canadian groups is a translucent mound of alabaster, composed of blocks as taken from the quarries, side by side with which are beautiful statuettes and other sculptured forms. An admirable piece of work in their vicinity is the leaning tower of Pisa, cut from a block of alabaster extracted near that city. There are also many specimens of the famous marbles of Italy, including a large octagonal font, which for more than three centuries stood in the convent of Gesú e. Maria at Rome. This is made of the Claudian variety, one largely used by the Roman Catholic church, as in the cross on the "holy gate" of St Peters, and the consecrated stones of the altar. Sulphur from the Vesuvius and other districts is displayed in blocks and powders, with asphaltum, bitumen, and petroleum, also



GRECIAN EMERY PAVILION

from volcanic regions, and tiles of cement richly colored and ornamented with geometric designs.

The Grecian section was originally allotted to the United States of Colombia, which accounts for its position among the Spanish and Latin-American exhibits. The display, although small, is suggestive, containing as it does contributions from the famous Laurium mines near Athens, whose treasures in the ancient days of her naval supremacy went far toward building her fleets and supporting her citizens in luxury. They are now controlled as I have said by a French company, which also exhibit brimstone and sulphur in ores and powders. Elsewhere are magnesite blocks, with emery and lead in crude and manufactured forms. Marbles from the classic isle of Seyros present a business-like aspect, as though advertising themselves, and an altar of Athenian marble is erected by the committee of Olympus, not in honor of the gods but of the Columbian Exposition.

In the western vestibule of the hall are three large gilded cubes, the inscriptions upon which inform us that since 1745, when Russian gold was first mined in commercial quantities, the empire has produced more than 1,800 tons of that metal, Siberia furnishing nearly three-fourths. South of this monument are shown in specimens and photographs the varied mineral resources of a domain which covers one-sixth of the entire land surface of the globe, one side being occupied with a row of cases in which are hundreds of bronze figures symbolic of civilization and barbarism. A shaggy-coated bear rears his unwieldy form beside the figure of a nobleman, and a gaunt wolf crouches near the feet of a richly attired lady. Horses, stags, and dogs, peasants and high officials, princes and Cossacks, with typical representatives of various classes are here reproduced in miniature. The iron works of the Ural and other noted districts have also contributed of their ores and first forms of manufacture, and a fine display is made of swords and cutlery, many of the articles with handles of skilful design and workmanship. Maps indicate the most promising and productive districts for gold, coal, petroleum, salt, iron, copper, and other minerals. There are also photographs of the more valuable mines of coal and rock salt, and near one of the entrances are massive specimens of the latter, in contrast with which blocks of black marble display their shining surfaces.



CRUCIBLES OF GRAPHITE

Adjacent to the Russian section on the north is the small space in which Japan reveals her mineral wealth, as yet but little developed. The entrance-ways are in rustic form, and within is a tastefully arranged, instructive, and unique exhibit. In the centre are ingeniously constructed models showing the cross sections of mines as worked in ancient and modern times. Front views are also given representing a dark cave which forms the inlet to the old mine, and an ornate pavilion through which one passes into the other. Japanese miners are shown in the narrowest of galleries, lying upon their backs or stomachs, working like slaves, and exposed to all the dangers of caves and explosions, while the tools and apparatus for extracting ore and pumping water are of the most primitive kind. As Japan has recently adopted modern machinery and methods of timbering, the interior view of the mine of to-day presents no remarkable features, the chief interest centring in the skilful workmanship of the model. Close at hand are specimens of coal and copper, silver and gold in the ore and leaf, antimony, commercial clays, variegated marble, graphite, sulphur, native and refined, and table salt in plain and ornamental forms, the first two articles representing an annual yield of about $10,000,000. Among the minerals displayed in manufactured forms are crucibles made of graphite. There are also photographs of some of the most productive mines, and maps showing the location of coal-fields and collieries, as well as the geological distribution of soils, while specimens of the soils themselves may also be examined, the entire exhibit being mainly organized by the mining and geological bureaus.



JAPANESE MARBLE



AN AUSTRIAN PAVILION

In the southwestern portion of the hall are the exhibits of Spain and Latin-American countries. The display made by the former consists of massive specimens of lead ore, with primary manufactures of lead, samples of copper, phosphates, salt, slate, marble, and many other minerals. There is also Cuban asphalt, which contains 70 per cent of bitumen, and is said to possess great commercial possibilities. Among the decorative features in the Spanish pavilion is a large array of mining tools, tastefully grouped at various points.

Elsewhere among these groups is sufficient evidence that the republican offspring of Spain are by no means lacking in enterprise. A pyramid in the centre of Brazil's pavilion represents the output in gold of the once famous Minas Geraes, which during the early part of the eighteenth century produced $700,000,000 of that metal. Around its base are several varieties of marble and granite, while in trophy and other forms the coal mines of Rio Grande do Sul illustrate the mineral wealth of the country. Mica, quartz, and asbestos are shown in many beautiful forms, together with lead and copper ores, and the display of gems, though brilliant, attracts less attention than a remarkable stone of elastic qualities, of which there are abundant deposits in the state of Minas Geraes.



ALABASTER STATUARY

The live-stock and agricultural interests of the Argentine Republic completely overshadow the mining industries, which thus far have not developed into commercial importance. In this department, however, the government bureau of mines and geology has tastefully decorated a large section in blue and white, installing therein specimens of marbles and other building stone, with clays and salts, iron and coal. The geological maps hung upon the walls indicate that the most promising mineral deposits are in the northwestern portions of the country, near the headwaters of the Negro and Colorado rivers.

Ecuador and Bolivia have but a miniature display, the former presenting a few specimens of gold among a miscellaneous collection, while the ancient glories of Potosí are but feebly represented in the tiny pavilion of the latter, her mines, which in the sixteenth century produced as much as $80,000,000 of silver a year being almost abandoned. The largest mines are now at Huanchaca, and are mainly controlled by Chilean capitalists; but their wealth finds little expression in the hall of Mining. Other exhibits are masses of crude rubber, a portrait of the president, and a large table made by a resident of Cuzco, who informs us that he is no cabinet maker but sends his handiwork, composed of the choicest varieties of native woods, as a contribution to the Fair.



ALABASTER STATUARY

Nitrate of soda forms the text of Chile's exposition. It is displayed in various shapes, a large model of the famous works at Rosario de Huara showing one of the largest establishments for its manufacture in the world. Upon a shaft within this section are statistics as to the growth of this industry from 1830, when only 800 tons of nitrate were exported, until, in 1890, exports had increased to more than 1,000,000 tons. Not only is this a most important source of individual wealth, but the national treasury derives therefrom an annual income of $20,000,000, or more than one-half of its revenue.

In Mexico nearly 4,000 mines are under regular exploitation, with others worked at intervals, and a vast number of abandoned claims, many of which if reöpened would yield excellent returns. While as a rule



PORTION OF MEXICAN SECTION

processes are somewhat primitive, modern appliances have been largely introduced among the more productive mines, and especially in those which have passed under foreign ownership. One advantage is the cheapness of labor, wages varying, according to the nature of the task, from 50 cents to $1.25 a day, the latter rate for the barrateros who extract the ore, sometimes receiving in addition a share of what they take out. Other fostering influences are the security for life and property established under the Diaz régime, and the building of railways, affording direct communication with the United States; for until recent years nearly all the heavier machinery was imported by way of Vera Cruz.

The history of mining in Mexico dates almost from the time of the Spanish conquest, and yet her deposits of the precious metals show no signs of exhaustion, the yield of those which have been abandoned being more than compensated by new discoveries. Between 1521 and 1891, a period of 370 years, the total production of silver has been estimated at $3,570,000,000, and of gold $277,000,000, while the present yield of both these metals may be stated at somewhat over $40,000,000 a year. Of coal the annual output is worth about $4,000,000; of copper, $2,500,000; and for other minerals, metals, and metalloids, including iron, sulphur, salt, mercury, clay,. and ornamental and precious stones, may be added a value of $25,000,000, thus giving to her mining and mineral products a total valuation of more than $70,000,000.



ROSE GARNETS

To Mexico was allotted a liberal space in the southwestern section of the hall, her display far surpassing those of Spain and other Spanish-American countries. Here, as in the Manufactures building, an attractive feature is the collection of ornamental stones, and especially of onyx, and a newly discovered variety to which has been given the name of rose garnet. The latter is one of the most remarkable of minerals, combining some of the best qualities of ornamental and building stones, and the only deposit thus far discovered is at Zalostoc Morelos, within 100 miles from Mexico, near a line of railway, and in sufficient quantity to permit systematic development. It is, moreover, a merchantable stone, one which, though harder than granite, can be easily quarried, cut, and polished, and is not affected by the most violent changes of temperature. Technically it is described as a silicate of lime and alumina, and when worked into thin slabs and placed in a strong light, a beautiful color effect is produced, the garnets largely adding to its decorative qualities. Near



CAPE COLONY

the eastern entrance-way are pillars, slabs, and ornamental and geometric designs in rose garnet, while the rare beauty of its texture is further illustrated in a delicate plate of the mineral contained in an illuminating apparatus. Elsewhere the exhibits, selected with the utmost care through a commission appointed by the government, are for the most part arranged in cabinet form, many of them contained in handsome bronze show-cases. There is also a group of ore-washing apparatus, and viewed as a collective exposition of mining resources and industries, the entire display is one of which our sister republic has good reason to be proud.

Nowhere in the hall of Mining is there a more attractive spot than the Cape Colony section, south of the Brazilian exhibits; for here of an afternoon, between the hours of two and four, is shown the process of diamond washing from soil imported from the richest deposits of the Kimberley mines. To Americans this should be of special interest, for by the United States are purchased considerably more than one-half of the $20,000,000 worth of diamonds annually produced by this famous district, almost entirely by a single company, whose rate of production is thus restricted only to maintain the market value of its output.

The section is surrounded by a high partition, with plate-glass windows, within which the earth is scattered as found in the mines; but a better view of the processes of washing and cutting may be obtained from an elevated platform, to which a stairway leads from the ground floor. First of all the sand is washed away from the pebbles in a large pan or pulsator, and that which remains is placed in a cylinder, with spiral motion and apertures of various sizes, through which the pebbles are dropped into the sieves beneath. These operations are conducted by stalwart Zulus, attired in full dress Exposition costume—a cap and a pair of short trousers; for other garments they cannot be induced to wear. One of the Zulus stands guard at the gate, armed with a war club with massive ivory head. He is a chieftain of his tribe, a man of gigantic stature, and one of the impi which defeated the British troops in the days of King Cetshwayo.



CAPE COLONY DIAMOND MINES

The pebbles are handed to the sorter, who spreads them upon a table and searches for the diamonds, several valuable stones being taken at times

from a single pan of earth. The rough diamonds are then delivered to manipulators for cutting and polishing, and are thus prepared for market, losing about half their weight through these processes, of which the latter is performed by a revolving plate making 2,000 revolutions to the minute. In a glass case are rough diamonds valued at $750,000, including all colors, forms, and degrees of crystallization, from deep brown to purest white, and with many intermediate shades, as blue, green, pink, and orange-yellow. There are also the black diamonds used for cutting, the hardest of all varieties, and such freaks of nature as the twin diamond, the latter exceedingly rare. Other exhibits from southern Africa are specimens of copper ore from Namaqualand; asbestos, whose fibres are of a bluish tint; and a cabinet of minerals collected in the region south of the Zambesi river.



A DIAMOND MINING DISPLAY

In the eastern sections of the hall, and extending into the area occupied by the states, is a large display of mining machinery of many patterns and many purposes. The most extensive exhibits are by Fraser and Chalmers, the Chicago Iron works, and the Gates manufactory, all of Chicago, the specimens from the first of these firms being among the most massive in the building. An imposing structure is the so-called Chilian mill for the crushing of gold and silver ore, its ponderous rollers, as they revolve upon their axis, having also a horizontal rotary motion within the huge metallic die. This is a sample of the score of such mills now in operation in Mexico and the United States, and its companions in this section are several huge quartz mills, a lead furnace, rollers for such fine work as the crushing of diamond bearing earth, and a large assortment of apparatus for the reduction and refining of copper ores. Of the latter mineral, there is a compartment filled with many beautiful specimens, the company also showing samples of a recently discovered alloy, known as ferro-alumina, which is claimed to be the strongest and hardest metallic substance known, and is specially valuable for such castings as the shoes and dies of stamp mills and rock crushers. In the section occupied by the Chicago Iron works are apparatus for crushing quartz, for smelting ores, and for hoisting and pumping, while across the aisle is a crushing plant, installed by the Gates company, including a leviathan rock breaker with a capacity of 150 tons an hour. In this section is also a model in operation, showing the processes of crushing, elevating, screening, and distributing stone used for paving or ballasting.

Elsewhere are various mills for the grinding of rocks, ores, and all other refractory materials, their chief distinction consisting of the various motions with which the rollers work in their dies. Many of the machines are arranged for either wet or dry grinding, some of them stationary, and others portable. There are also

mills which serve both as pulverizers and separators, with apparatus specially designed for the preparation of paint materials.

The collection of drills is an interesting feature, the machines being of all sizes and makes, one of them for boring to a depth of a mile or more. Elsewhere is apparatus for sawing and polishing stone, contributors from the eastern and middle states being foremost in this display. Another group consists of chain belting and appliances for elevating and hauling minerals. Of this class the Jeffrey manufacturing company, of Columbus, Ohio, is a prominent exhibitor, its section containing, besides a large assortment of machinery, a model showing a section of a coal vein. Illustrating the method of moving ores and coal, is an underground haulage plant, in a tunnel beneath the southern portion of the building, composed of a wire-rope tramway, cars, and engine furnished by several companies. At the further end of the hall, on the ground floor, is a system of iron pipes, representing an invention whereby it is claimed great saving of time and money would result from conveying minerals in semi-liquid form from mine to market, pulverized, mixed with water, piped, and then, after reaching their destination, pressed into solid cakes.



KIMBERLEY, SOUTH AFRICA, EXHIBIT

In the machinery department are also exhibits of metal manufactures. Ploughs, rails, fence-wire, and other forms of iron and steel are displayed by a Pennsylvania company, the key-stone state being further represented by two tasteful pavilions of sheet iron, one of them surmounted by a golden eagle. In the official classification these exhibits are grouped under the head of the metallurgy of iron and steel, while under the



GENERAL VIEW LAGOON



THE AGRICULTURAL BUILDING FROM THE SHORES OF THE GRAND BASIN

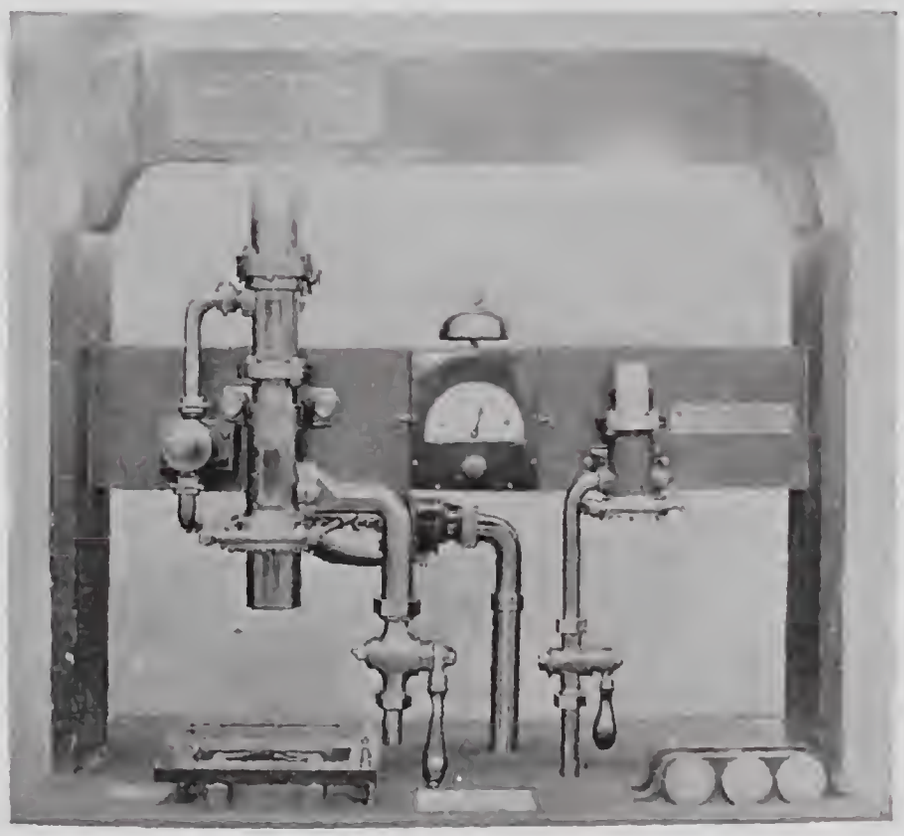


ASBESTOS THEATRE CURTAIN. SUBJECT: READING HOMER

class designated as copper and its alloys is the pavilion constructed of brass and copper tubes by Randolph and Clowes, of Waterbury, Connecticut. The latter stands at the eastern entrance to the building, across the hall being the golden trophy symbolic of Russia's mines, and between the two the great shaft of coal from Pennsylvania. Coal is also, as I have said, at the base of the monument in the northern end of the hall, representing the mineral production of the United States for each second of time, with asbestos at the apex of the structure. But among all the forms of mineral manufacture there are none more striking than those exhibited by the H. W. Johns Manufacturing company of New York. In a tasteful pavilion the firm has a display of raw asbestos, showing also their looms in operation, with felt in various shapes, a fireman clad in garments of asbestos, and a miniature theatre curtain of the same substance, one considered as nearly fire-proof as textile fabrics can be.

Near the German section, in the southwestern entresol, is the general exhibit of ores and other minerals, with an exposition of the modern processes by which the metals are extracted and transformed into commercial products. Along the central aisle, as a supplement to these object lessons, is a series of small transparencies, copies of cotemporaneous illustrations depicting the ancient and primitive workers in metals of all countries, with their rude apparatus and environment. The entire exhibit is the creation and special pride of the chief of the mining department.

In the copper and tin section are illustrated, by photographs and specimens, the dry and wet processes of reduction, the tin of South Dakota and the copper of Montana being plentifully displayed in their crude forms. A company whose specialty is the refining of copper also shows its method of decomposition by electro-medical agencies.



SLUICE VALVES

It is in this vicinity that Arthur C. Wendt, a New York engineer, shows the first of the many photographs which he has distributed almost throughout the entire department. Here are reproduced the works that he has erected at Antofagasta, Chile, for the crushing, smelting, and



ROLLS OF ASBESTOS FELTING



NEEDLE OF ANTHRACITE COAL, PENNSYLVANIA

refining of silver and copper. The Huancha company, by whom he was employed, is now one of the largest private producers of silver in the world, with a yield from its mines, since 1877, valued at more than $43,000,000. The plant at Antofagasta includes nearly 60 furnaces, of which two are for the refining of silver, with many huge copper pans and settling tanks.

Among these groups a New York firm presents a collection of rare coins, and of cruder forms of metals, with their alloys. Another New York company has a complete assortment of metallic nickel, salts, and alloys, while a Virginia factory shows artistic forms of zinc. Elsewhere, in photographs and models, the methods of extracting gold and silver by modern leaching processes are fully explained, the Russell company of Park City, Utah, making the largest and most interesting display. Its process is distinguished from the old leaching method by the use of bluestone in the hyposulphite solution, and of soda ash as a precipitant for lead. This may be applied to free and rebellious silver ores, and to silver-gold ores and tailings, either in the raw state or after roasting, and has been adopted by various mills in Mexico, Montana, Utah, and Colorado. Whatever its merits as compared with other processes, many expert metallurgists claim that the extraction of gold and silver by lixiviation, or leaching, will eventually supersede both the smelting of ores and the separation of the metals by amalgamation with the use of mercury as a dissolving agent.

Among the exhibits of antimony and mercury, the quicksilver of New Almaden, California, and cinnabar ores from the golden state form the basis of the collection, most of the remainder coming from eastern firms. In this class is included the new metal called electricon, displayed by a New York firm as an anti-friction compound. It is generally admitted, however, that aluminium in some form is the coming metal of the world, and to this has been allotted a liberal space side by side with the groups of iron and steel. Aluminium is shown in composition with iron, gold, ferro-manganese, tin, and copper.



GENERAL VIEW OF LAGOON



ON WOODED ISLAND

as well as in many manufactured products, a reduction company of Pittsburg, Pennsylvania, occupying the largest space in this section. There are several exhibits on the ground floor which illustrate the metallurgy of iron and steel, including those which show the methods of manufacturing crucible and open hearth steel, the different forms of sheet iron and steel, steel castings, and projectiles. In the gallery are more compact displays, explanatory of these and such other branches as the chemical process of puddling, with mineral wool in all forms, furnace slags, samples of welding, and specimens of tools whose heads are finely tempered.

Beyond the metallurgical department, in the south gallery, is a library containing publications of interest to the mineralogist, with a collection of photographs of eminent men in the domain of this practical science. Midway in this gallery is a large pavilion, in and around which American manufacturers of tin and terne display their wares; and in the southeastern corner are assaying and testing laboratories. A Pittsburg company shows chemical substances for the testing of minerals, and adjoining its compartment is that of a Chicago establishment, containing furnaces, blow-pipes, and other apparatus, in the operation of which heat plays the leading part.



SCENE ON THE BEACH

Except for a few mineral cabinets from the eastern states, and miscellaneous collections from California and New Mexico, the southeastern galleries are virtually monopolized by the exhibits of Ward's Natural Science institute of New York. To describe



DISPLAY OF STANDARD OIL COMPANY

this collection in detail would be simply to review the entire domain of geology, with its kindred department of mineralogy. There are several collections, however, of which special mention should be made. Besides many specimens of the precious metals, there is a case containing casts of gold nuggets which have become historic, the list including the Welcome nugget found at Ballarat, Victoria, in 1858, weighing more than 2,000 ounces, and valued at $41,000; the Viscount and the Viscountess Canterbury, both also from Victoria, unearthed in 1870, and valued respectively at $21,000 and $17,000; the Precious, discovered during the succeeding year in the same district, valued at $31,000; the gold nugget taken in 1842 from the Ural mountains, Siberia, weighing 100 pounds and worth $22,000, and the mass of platinum, weight 21 pounds, found there in 1827 and said to be the largest ever mined in a single piece. Another remarkable collection is contained in flat cases along the central aisle, including several hundred gems and ornamental stones, the more precious varieties represented by actual specimens or by models in glass, showing the exact color of the originals and the forms in which they are usually cut. There are similar models of the celebrated diamonds of the world, comprising fac-similes of fifteen historic gems, from the Polar Star, weighing 40 carats and belonging to the Russian princess Youssoupoff, to the Koh-i-noor of the British crown, and the immense stone in the possession of the Great Mogul, said to weigh 297 carats. Of meteorites there is a large collection, and another interesting exhibit is that which explains the structure of the earth in specimens and geological models, the latter showing not only the order of stratification, but the principal features of erosion and displacement.

The most noteworthy collections in the northeastern and northern galleries are those which consist of coal, coke, and petroleum. The northern entresol is mainly occupied by the Standard Oil company, which has transformed it into a pavilion, its walls and ceiling of a delicate cream color, with decorations in gold. At either end of the section is a minor pavilion, surmounted by a cupola, within whose colonnade is a female figure holding aloft a lamp of antique design. Along the front is a geological representation of the oil producing districts in New York and Pennsylvania, and against the windows at the rear is a large galley of beautiful transparencies showing the manufactories of the company in Philadelphia, Whiting, and Lima, and its facilities for piping and transporting by steamer and railroad. In one corner is a pyramid of miniature oil barrels, representing the daily product; elsewhere are models showing apparatus for refining, and everywhere are glass vessels filled with petroleum of various grades, and for many purposes. The collection of lamps ranges from the tiniest specimens to such as are used in lighthouses; and in one of the pavilions to which reference has been made are some magnificent specimens of richly ornamental metal and porcelain. In show-cases, built into the outer walls, are others of less elaborate design, with those typical of various



ALSEN'S CEMENT PAVILION, GERMAN DEPARTMENT



VENETIAN BOAT IN LAGOON

countries, one of the latter being an oil lamp used in northern India long before the Christian era.

In the northeastern galleries the Frick Coke company of Pennsylvania reproduces its plant in a series of models, a portion of the miniature machinery being operated by electric power. In the centre of the section is the name of the company, in letters of coke, and upon a huge pile of that material is the inscription "41,000 tons daily."

Many months ago a veteran miner, named Boyce, undertook the task of collecting, for exposition at the Fair, samples of coal from the great producing districts of the United States. The result is displayed in a large number of cubes, contained in cases, which form the enclosure of a small section adjacent to that of the Frick company. The greater portion of the space is occupied by a map of the United States painted upon panels of glass, and showing the location of mines which produce such varieties as gas, smithy, steam, coking, and domestic coals. All the cabinet specimens have numbers corresponding to those on the map, and thus the visitor may ascertain at a glance the varieties of coal produced in each locality.

Near by are many collective exhibits which here need only the briefest mention. Among them are building and ornamental stones, the New England states, New York, South Carolina, Iowa, Illinois, and Colorado showing samples of their granites and slates, while a firm doing business in the empire state has erected a pavilion for the display of Mexican and Californian onyx. Beyond this are all the substances known to manufacturers for grinding, abrading, and polishing, including emery, pumice, corundum, and a compound



MACHINERY HALL FROM THE COURT OF HONOR

known as carborundum, composed of silica and carbon combined by an electrical process. Wheels made of this substance are claimed to be the hardest of cutting apparatus, and are especially valuable for polishing diamonds.

In this vicinity are also various exhibits of graphite, and crucibles made of that substance, including collections from several of the oldest manufacturers in the United States. In one of the sections is a solid block of graphite from Ceylon, weighing more than 260 pounds. Cements, asphalts, and artificial stones are arranged in many attractive forms, several of them in ornate pavilions, as those of the Warren Chemical and Manufacturing company and the Barber Asphalt company, of New York, and the Acme Cement Plaster company, of Salina, Kansas. Samples of natural asphalt are shown from the lake of pitch on the island of Trinidad, with an artistic model of that natural curiosity. At the northern extremity of the eastern entresol is a comprehensive assortment of sulphur, saltpetre, brimstone, and mineral waters, mainly furnished by New York companies, with a large relief map of that state, and a smaller one of the West Indian isle of Navassa, noted for its extensive deposits of sulphate. Close at hand is the only collective exhibit of salts in the Mining hall, with specimens from New York, West Virginia, Ohio, Michigan, Kansas, Texas, Utah, Nevada, and California.



COLUMBIAN CHAIR BOYS



J. A. YERINGTON, NEVADA

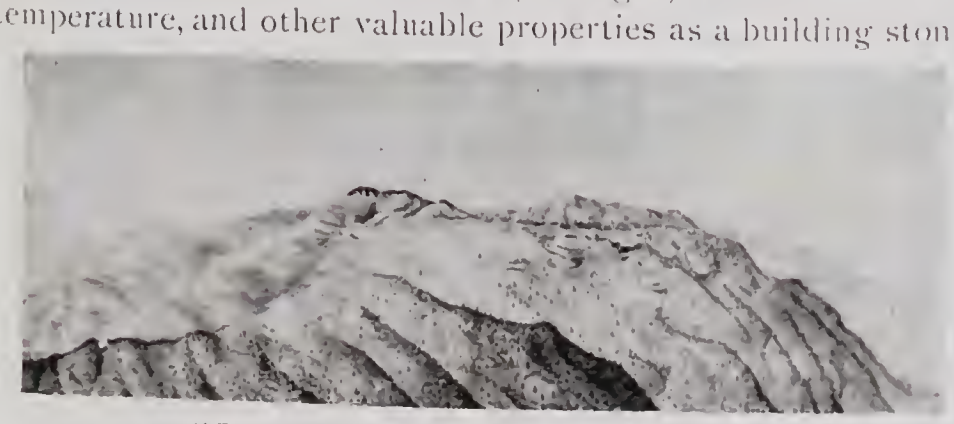
World's Fair Miscellany.—While, as in other departments, exhibitors, whether of machinery or processes, must be their manufacturers or inventors, they might be represented by an agent appointed for the purpose, subject to the approval of the director-general. With all specimens of ore must be given a brief description of their character and of the location of the deposit, with a rough analysis, and, at the discretion of the exhibitor, such other data as might be of general interest. No blocks of ore or coal must exceed three feet in diameter, except by special permission, and for slabs of marble, artificial stone, etc., the limit was four feet square of surface.

The 28,000 pound block of coal contained in the British section is said to have cost more than $5,000 to place it in the Mining hall, or at the rate of $357 a ton. To hew it out and hoist it to the surface was a nine months' task, rails being laid through the galleries of the mine, and a long steel car constructed to haul it to the shaft. Several tons of earth were removed from this specimen before it was forwarded to the Alexandra docks at Liverpool, and thence conveyed to Jackson park.

The silver contained in the statue of Justice in the Montana section was extracted from native ores at various smelting works throughout the state, the entire mass being melted in a crucible at Grand Crossing, and poured into a mold more than eight feet in length. To construct a mold which would reproduce an exact counterpart of the model, fashioned in plaster by Parks, and to cast the figure without flaw or blemish, was a task of no slight difficulty. This was finally accomplished during the month of March, though for several weeks before expert founders had been at work. The molten metal was carefully poured into the mold in the presence of a number of invited guests, among whom were the presidents of the National Commission and the Chicago board. The figure, swathed in cotton batting and woolen cloths, was brought to the Mining hall on a truck in a long, low, coffin-shaped box, and was thence removed by a derrick and fifteen stout laborers to the floor of the building, from which it was hauled by windlass and crow-bars to the Montana section. The statue was unveiled on the 30th of May.

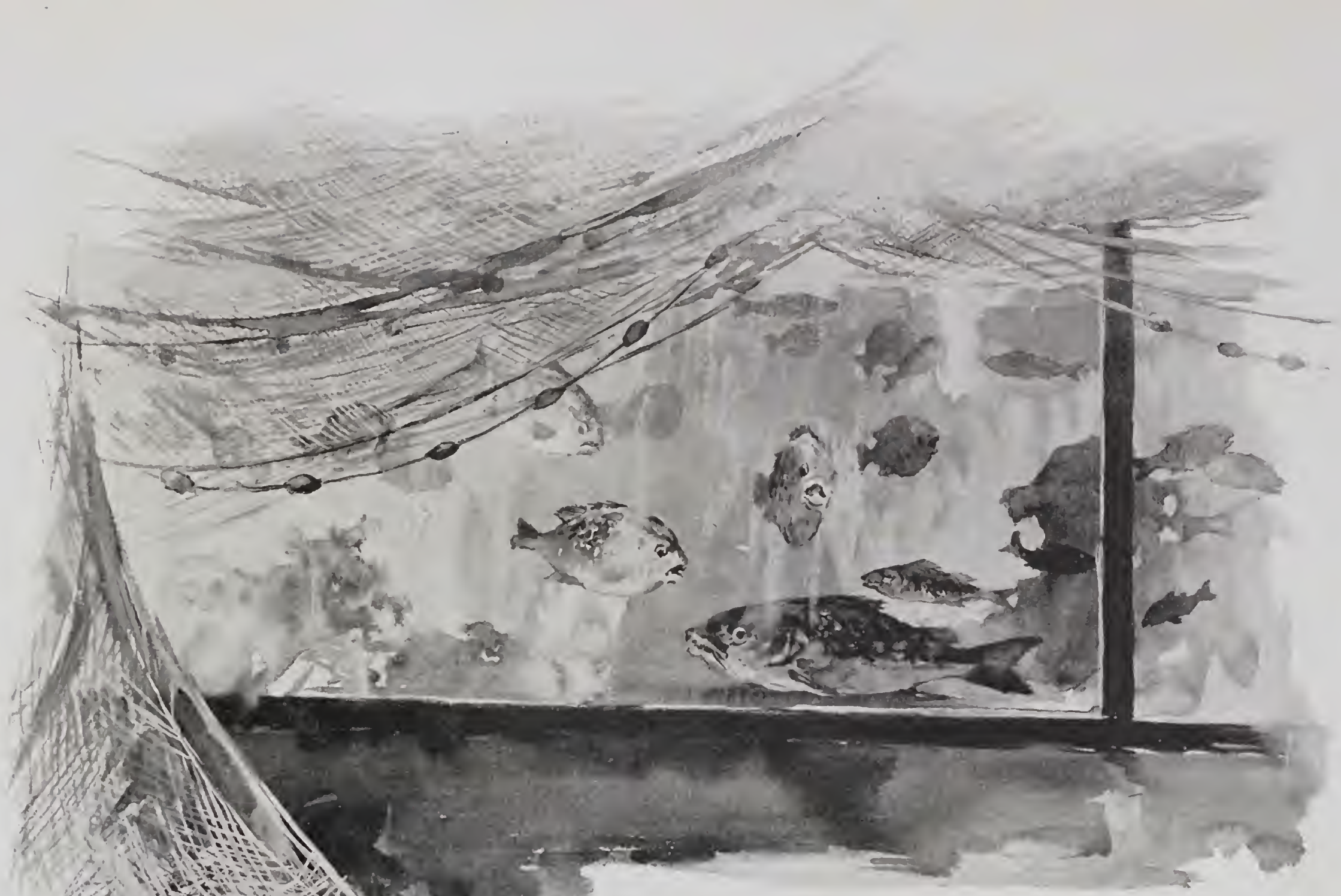
In connection with the exhibit of diamonds from the Kimberley mines in Cape Colony, it may be mentioned that, since their discovery in 1867, several tons of diamonds have been exported from that country, representing a money value of $500,000,000. The field is now virtually absorbed by the De Beers company, which, for the four years ending June 30, 1892, produced 7,421,000 carats' weight of diamonds, worth more than $50,000,000, paying annual dividends of 10 to 12½ per cent on an invested capital of nearly $20,000,000. During the last of these years there were washed 3,240,000 loads of earth, yielding 3,035,000 carats, valued at about $19,000,000, the dividend declared amounting to nearly $2,500,000. While there are some large and valuable stones in the Cape Colony exhibit, none will bear comparison with the large orange-yellow, double-deck brilliant displayed in the Tiffany collection in Manufactures hall.

The deposit of rose-garnet, mentioned in connection with the Mexican exhibits, was discovered by one Niven of New York, a mineral prospector of scientific attainments. A specimen forwarded to New York was pronounced to be the best ornamental stone of modern times. In an article on the Columbian Exposition in the Berlin *Zeitung*, Julius Lessing describes it as "a gray marble containing garnet-red masses which have every appearance of costly inlaid mosaic work, all varieties of color, from deep red to the most delicate yellow and milk white, appearing in the same block." Laboratory tests have demonstrated its hardness, strength, resistance to extremes of temperature, and other valuable properties as a building stone.



VIEW OF THE WEST SIDE OF TREASURE HILL

After the close of the Fair it was intended to present the Idaho state collection of minerals to her university. An offer made for it by the university of Chicago was declined. The ruby sand, mentioned in the text as one of Idaho's exhibits, is contained in small vials, and came from the Neal district. At first sight it does not appear to differ from common sand, but when closely inspected red and brown particles are observed, shining like rubies. These form the metallic base of the earth known as zirconia, and are worth more than thrice their weight in gold. In Washington county, Idaho, there are places where zircon sand exists in paying quantities, and at Baltimore are the only works for its reduction.



CHAPTER THE SEVENTEENTH

FISHERIES AND PISICULTURE

FAR back to pilgrim days can be traced the origin of our domestic fisheries, for by them was saved from starvation the infant colony at Plymouth, and by their proceeds were supported the first public schools established on New England shores. Some two years before the *Mayflower* bore westward the fathers of the republic, a company of Puritans, returning from their sojourn in the Netherlands, besought King James for permission to found an American colony. "What profit might arise," inquired his majesty. "Fishing," was the answer, in a single word. "So God have my soul, 'tis an honest trade; 'twas the apostles' own calling." Such was the monarch's decision, and so the permission was granted.

Except for despatching a ship in 1624 to establish a fishing station at Cape Ann, the Plymouth colony took no active part in the earlier development of American fisheries. This station they abandoned after a single season, and, as is related, their vessels, "well laden, went joyfully home together, ye master of ye larger ship towing ye lesser ship at his sterne, all ye way overbound." Meanwhile had been shipped from that point, in the previous year, the first cargo of fish for European markets. Thenceforth the industry grew apace, until, at the outbreak of the revolutionary war, there were more than 500 fishing craft belonging to Massachusetts ports alone, their total catch being valued at $750,000. Then came further troubles, followed by the war of 1812, and almost from that date until the settlement of the Bering sea controversy, progress has been retarded by foreign complications and injudicious legislation. Many a time has the remark been made that "our fishermen are always bringing trouble on the government." Rather should it be said that the government is ever bringing trouble on our fishermen. But notwithstanding all obstacles, the yield of fisheries has attained to mammoth proportions, and now for the first time in the annals of international expositions, this industry, with all its adjuncts, finds adequate representation in a home of its own.

In the Fisheries division of the Fair are included many branches, in addition to such as relate to the quest and capture of animals and plants whose home is in the water, entirely or in part. In the official classification are included fish and other forms of aquatic life; sea fishing and angling; fresh water fishing and angling; the products of the fisheries and their manipulation, and fish culture. In addition to the United States are represented nearly all nationalities among whom fishing is a prominent industry, from New Brunswick to New South Wales, the harvest of sea, river, and lake, "gathered," as has been said, "in wasteful fashion from a crop that is neither sown nor tended," amounting annually to more than 2,000,000 tons, and affording direct employment to at least 1,000,000 men and 200,000 vessels. In the United States the take of fish exceeds 250,000 tons a year, of which about one-fourth comes from the waters of the great lakes, with a large production from Atlantic and Pacific grounds, while the whale and seal fisheries still produce largely, though with a steadily diminishing yield. As to the fisheries of other lands, brief mention will be made in connection with their exhibits in this department.



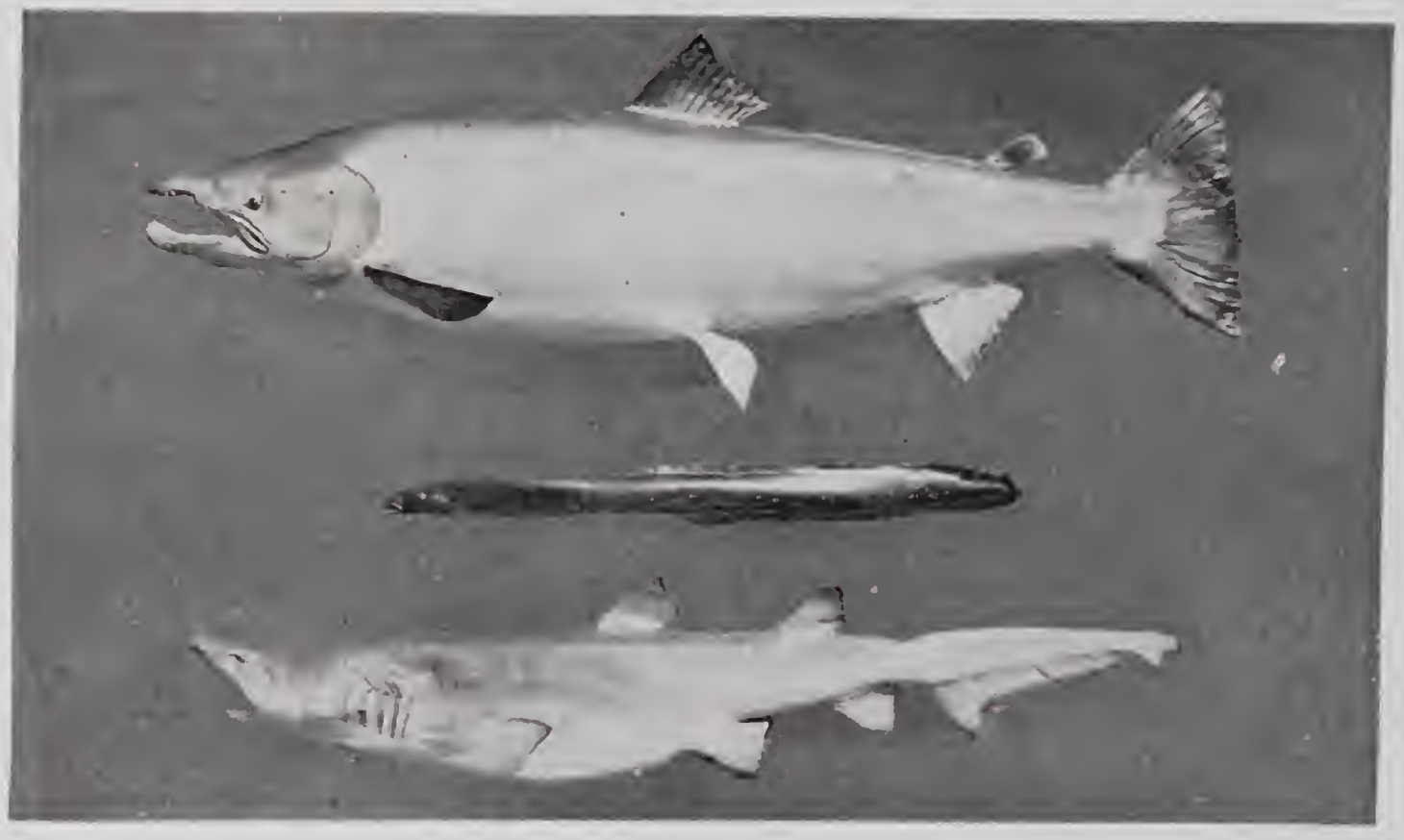
FISHERIES BUILDING, FROM WOODED ISLAND



FISHERIES BUILDING

Facing in front an arm of the lagoon by which it is separated from the government building, and with one of its polygonal annexes bordered by a miniature estuary opening into the lake, the Fisheries pavilion raises its clear-cut outlines against the sky. In the fantastic design of this edifice, or rather group of edifices, we have somewhat of a relief from the architectural classicism of its environment. By his brethren of the craft, this composition, with its opulence of decorative features, conceived by Henry Ives Cobb, has been pronounced "an architectural poem." However this may be, it is certain that Mr Cobb has given us a structure admirably suited to its several purposes, one that, in treatment, not only departs from the conventional style of its neighbors, but, as with the Horticultural hall, is of itself an illustration of the uses for which it was built.

In the main edifice, devoted to fisheries in general, to pisciculture and scientific investigation, we have a rectangular structure of no special order of architecture, though based on the southern Romanesque, in length 365 feet, with a width between the entrance of 242 feet, and between the outside walls of about two-thirds of the latter space. Through the centre runs a spacious hall, 280 by 80 feet, lighted by clear-story windows, and around which is a continuous aisle, occupying the remainder of the floor space. Above are galleries, also encircling the entire structure, and increasing its exhibiting space to a total of 60,000 square feet. To give accent to its low, long curtain walls, the roofs, of glazed Spanish tile, were so constructed as to slope sharply to a central ridge. Surmounting them is a circular tower, over the centre of the nave, in diameter co-equal with its width, and around which are turrets, with staircases leading to the gallery and to an exterior balcony. Above the tower is a clear-story stage, also flanked by turrets, and above all, rising to a height of 150 feet, is a conical roof, capped with a belvedere, around the base of which is still another gallery. At the principal entrances, in the centre of the main façades, are pavilions projecting from the outside walls, adorned with sculpture work and statuary typical of the fisherman's craft. In the entire structure, with its double row of columns, their capitals depicting in endless groups all forms of life contained in sea or river, we have rather a playful delicacy than such grandeur of design as some might deem in keeping with its proportions. In this and other points the Fisheries buildings differ essentially from most of their neighbors; but with a difference to which none but the most captious of critics will take exception.



SALMON. EEL. LAND SHARK

In preparing his decorative scheme, the architect has produced some four-score models of columnar ornamentation, each of different and yet of conventional pattern. If in many of them there is found a strong element of the ludicrous and grotesque, it is only in keeping with the playfulness of design, and by no means detracts from the merit of composition. Rather does it serve, as one of his confrères remarks, "to make it

joyous and festive, without loss of dignity, grace, and fitness." Perhaps in none of the Exposition buildings have their artificers displayed a more striking originality of treatment, and that without treading on the dangerous ground of inventing new forms of architectural expression.

East of the principal edifice, in the direction of the lake, is the aquarium building, connected with it, as is the one devoted to angling exhibits, by a curved projecting corridor, so that the Fisheries hall appears to set back from its two flanking pavilions. The latter are of octagonal shape and somewhat similar design, the one containing the aquaria with clear-story windows and glass-roofed circular aisles in concentric arcs, surrounding and connected by arcades with a central rotunda, where, from the crevices of moss-covered rocks, rise jets of water in miniature fountains, descending in spray to the basin below. Here is a choice collection of aquatic plants, and of goldfish and other ornamental specimens. In the salt and fresh-water aquaria, which are ten in number, are displayed nearly all the known varieties that people sea or river. As to the dimensions of these aquaria, it need only be said that their capacity ranges from 7,000 to 27,000 gallons, and with a total of 140,000 gallons, apart from reservoirs and water circulation.



HOOKS AND LINES.

Southward, the main façade of the Fisheries hall faces toward the Government building, in the northern end of which are the exhibits of the United States fish commission, thus grouping in one display all the wonders of the great deep, and including river fisheries, pisciculture, and other branches presently to be mentioned. While at several of our great world's fairs there have been similar collections on a smaller scale, they have for the most part been scattered among other departments, and therefore wanting in unity and expression. Here, in accordance with the clause in the congressional act which provides for an exhibition of "the products of soil, mine, and sea", is for the first time afforded an ample and continuous illustration of aquatic industry and science. Nor is there any good reason why this industry, aptly termed the mother of commerce, and in many countries a prominent source of wealth, should not be fully represented at the Columbian Exposition. Still more appropriate would appear the emphasis given to this division, when it is remembered that fishing was one of the favorite pursuits of the native races of America, and that to their conquerors the pearl fisheries of the Isthmus were prizes coveted more eagerly than gold itself.

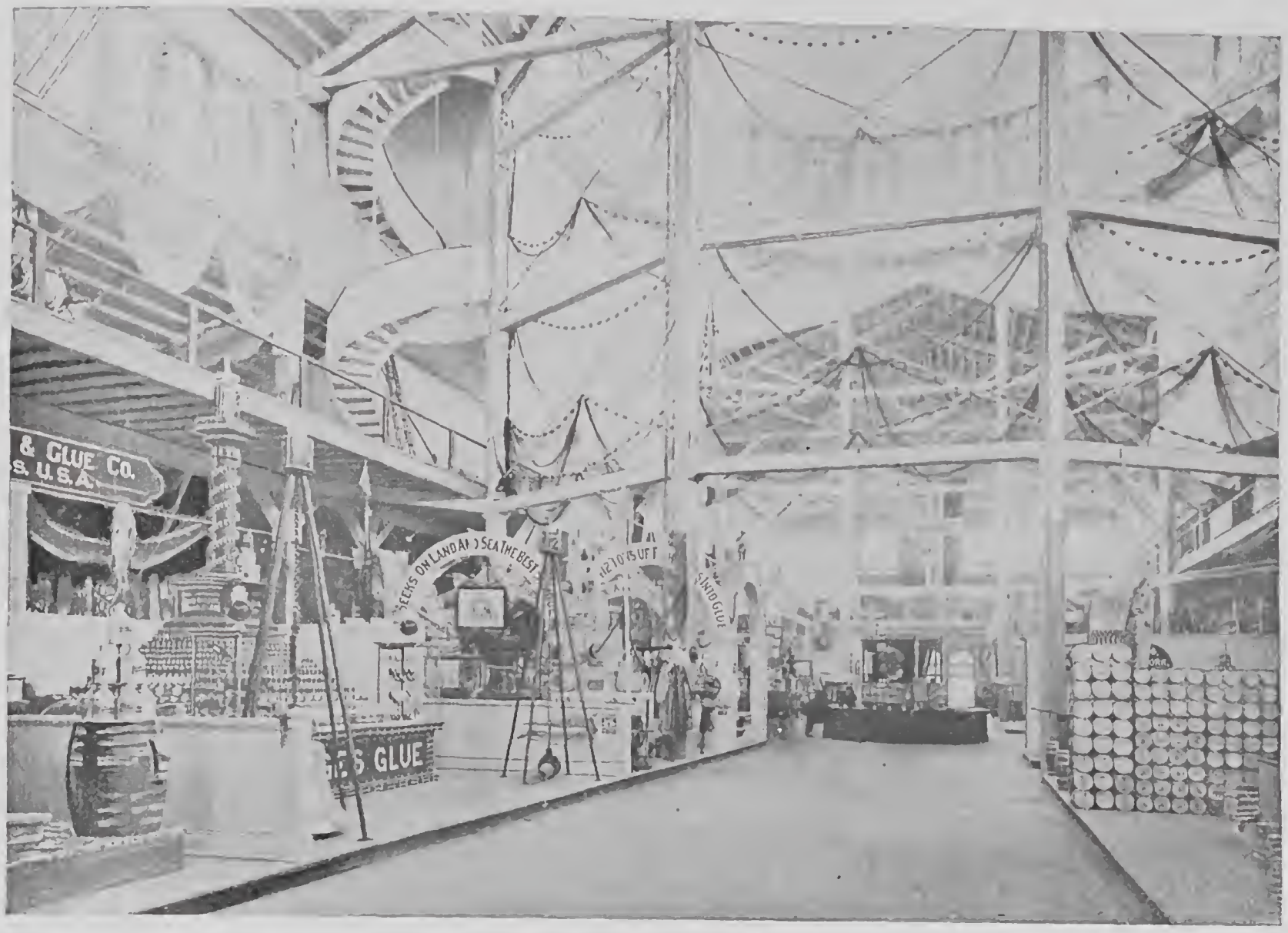


HERRING FISHING IN NORWAY



EXHIBIT OF FISH NETS

In the department of Fisheries is not only displayed in complete and interesting form their present condition, whether from a scientific or commercial point of view, but in a series of object lessons is portrayed their history for at least four centuries of the past. Almost side by side are the primitive apparatus of the savage, and the most approved appliances and methods evolved by many cycles of scientific progress. Here also are the laws and regulations, the reports and statistics, pertaining to fisheries. As to the fish themselves, there are few species that are not here represented, from the minnow to monsters of the deep, with river and shell fish of every kind, and with fish-eating birds, mounted on frames or preserved in alcohol. Of fish and fish stories described on canvas there is no lack, many of them depictured by artists of more than national repute.



INTERIOR VIEW FISHERIES BUILDING

In the angling department is a long array of rods, reels, tackle, and other appliances, showing the progress made in its various branches, and such as of itself forms a history of the pursuit which Walton ranked among the liberal arts. Of flies there are several exhibits, among the most interesting of which is the process of their manufacture by men and women actually at work on these delicate fabrics. Other kinds of artificial bait are also displayed in great variety; and near them is a collection of all such articles as pertain to the angler's outfit, while on the banks of the lagoon, in close proximity, are fishermen's camps, constructed of logs or canvas.

The centre of attraction is the exhibit of live fish in the aquarium building, where in tanks arranged in concentric circles is the largest collection of sea and fresh-water specimens in the world, except for the one contained in the Brighton aquaria on the southern coast of England. This was contributed by the United States fish commission, whose object was to present the best possible picture of fish-life, especially of the interior waters of America, and at the same time to illustrate the operations of the commission. While seeking to make it of educational value, everything has been done to show the different species in the most attractive form. That this is one of the most popular departments of the Exposition is attested by the crowds which daily inspect the many odd-looking specimens brought from ocean's depths and inland streams. To young and old it has proved a delight, and is studied by thousands who have never been within sight of ocean, and to whom the stories of the great deep are as the marvels of tradition.

The first point of interest is the pool in the centre with its gold fish and other bright hued specimens. The groups of stalactites from which a supply of fresh water is constantly dripping into the basin are in tasteful design. Here also are numerous specimens of rock, marine vegetation, and mounds of aquatic and semi-aquatic plants. Between the central basin and the circles of tanks are passage-ways six feet in width, the tanks numbering 50 in all, of which about two-thirds contain the fresh-water species to the right of the southern portal. They vary in length from six to 50 feet, with a total glass frontage of nearly 600 feet, and with 3,000 square feet of surface. Their decorations resemble those where the gold-fish are domiciled, with miniature mountains and caves made of a lime-like substance, called calcareous tufa, from the springs near Toledo, Ohio, while vegetable matter coated with limestone is wrought in fantastic designs. In building these tiny grottoes and reefs, a dark cement has been used, and the holes and corners are filled with dark earth, in which aquatic plants are deposited.



CANADIAN FISHER BOY

In the fresh water sections are all the species inhabiting the great lakes, rivers, and their tributaries throughout the United States. Here are beautiful specimens of lake trout, brook trout, rainbow trout, carp, tench, pike, black bass, many kinds of suckers, cat-fish, dog-fish gars, and minnows. Of gold-fish, the most attractive are the Chinese variety, with fan-like transparent tail, while the most handsome tank is that which contains the golden ide, of the carp family, indigenous to European rivers. In an aquarium 70 feet long by 12 in width are shown the largest specimens of the Mississippi basin and the great lakes, as the sturgeon, pickerel, cat-fish, white-fish, and bass. From inland waters are also the shovel-fish, lake herring, buffalo-fish, perch, and others. Then there are separate tanks for all fish indigenous to the Atlantic slope east of the Alleghany mountains. Here are in full splendor every species of edible and

commercial fish, with almost all the curious and hideous specimens in the waters of the United States, as well as a vast number of foreign species. There are the von behr from Germany, and the Lochleven trout from Scotland, as well as rainbow trout from California, black spotted trout from the Rocky mountains, and brook trout from every mountain stream in the republic. The different varieties of carp occupy a separate tank; and in this collection a most interesting fish to naturalists is the spoon-bill, or paddle fish, the only species of the genus, and the only genus of the family polyodontidæ in the world, and one that has never before been successfully preserved in an aquarium. In addition to aquatic plants, the fresh water tanks are well supplied with all kinds of water life, old logs being planted across the crevices, not only for the benefit of the fish, but to give to the surroundings a realistic appearance. The special design has been to make the environment in all cases correspond as far as possible with the habitat of the occupant, both as to fresh-water and marine exhibits.



HORSE MACKEREL

The marine collection has been gathered from great distances, ranging from Atlantic to Pacific shores. Three classes are represented; food, ornamental, and monster fishes. Tongued cod, spotted croker, pompano, tautag, sheeps-head, toad fish, sea robins, sharks, skate, porgies, and mummichogs are among the specimens of every important species known to science. Divers have searched the ocean for the rare forms of plant life which adorn the tanks, growing as in their native beds. Resting placidly on rocks and sands are crabs, lobsters, turtles, sea anemones, terrapins, snakes, and other invertebrates. Elsewhere are shrimps, snails, whelks; and there is a collection of such varieties as the sea-horse, trunk-fish, and puff-fish, the last the most repulsive in all the marine aquaria, covered with sharp spikes similar to the porcupine-fish. A peculiar specimen is the so-called nursing fish, with a wavy appendage several feet in width.



FISH NETS

The fresh water specimens are supplied with filtered water, kept at a temperature to suit their natural habits. The salt water is conducted in rubber tubes to a filter placed in the cellar and containing stones, gravel, and sand as in nature, and is then run off into a cistern with a capacity of about 60,000 gallons. A duplicate set of pumps operated by electric dynamos drives the water into a reservoir at the top of the building, whence it flows back into the aquaria. The stream carries enough air with it to aerate the water and enable the fish to breathe. Another method of aerating is by aquatic plants, which are continually giving off oxygen, and absorbing the



NET EXHIBIT

carbonic gas generated by respiration. The fish are well fed, and thrive better than could be expected, crowded as they are in cruel fashion within the narrowest of space, in a collection that appears to be needlessly duplicated.

In the main Fisheries building we will begin with one of its smallest and yet most interesting exhibits. This is contained in a small glass case near the southern entrance, and consists of a collection of shells, fashioned by a Memphis contributor into pansies, bouquets, bracelets, and other fantastic forms. Thence extends along the main floor and the southern gallery, the largest display of nets, seines, and twines that has ever been brought together. This is by the American Net and Twine company of Boston, in the centre of whose enclosure is a pavilion containing an infinite variety of specimens. A portion of the enclosure is covered with a net of ample proportions, beneath which is a miniature pound net, resembling in pattern such as are used on the great lakes, and a large assortment of gill netting. Spanish cast netting, herring nets, trawls, and sundry other articles are suspended here and there with decorative effect, and there is a labyrinth of net-work, comprising the English style of cast nets, models of weirs used in New England, salmon traps, and salmon weirs, with fish traps of all description. The entire space is draped with cod hauling seines as used on the Newfoundland and Labrador coasts, and in the rear is an oil painting of a fisherman in the act of hauling in his net. There are also shown by this firm purse seines, and their method of operation, all styles of gill nets, traps, and nets used in the great lakes, models of floating traps, mackerel poaches, and in a word a complete collection of apparatus for the capture of nearly every kind of marine and fresh water fish.

Adjoining the net and twine display, is an exhibit of oyster pails, patent oyster rakes, and similar articles. Another firm has an exhibit of scaling, washing, and weighing machines, and among other contrivances one for shaping, stamping, and weighing fish balls. Near by a Boston lobster firm shows an exact reproduction of a well-smack used for transporting lobsters to market. Through a flat glass casing, made to resemble the surface of the ocean, can be seen the bottom of the boat resting on what appears to be the bed of the sea. The vessel is supplied with windlass, wheel, blocks, and all other appliances for receiving, storing, and transhipping its cargo to the cars, which are lying alongside ready to receive their freight. On the opposite side of the aisle is a collection of sturgeon sounds, described as the "air, or swimming bladder of the sturgeon, skinned and dried, with neither taste nor smell, and therefore the purest article for jellies and other culinary purposes."



GLOUCESTER FISHING BOATS

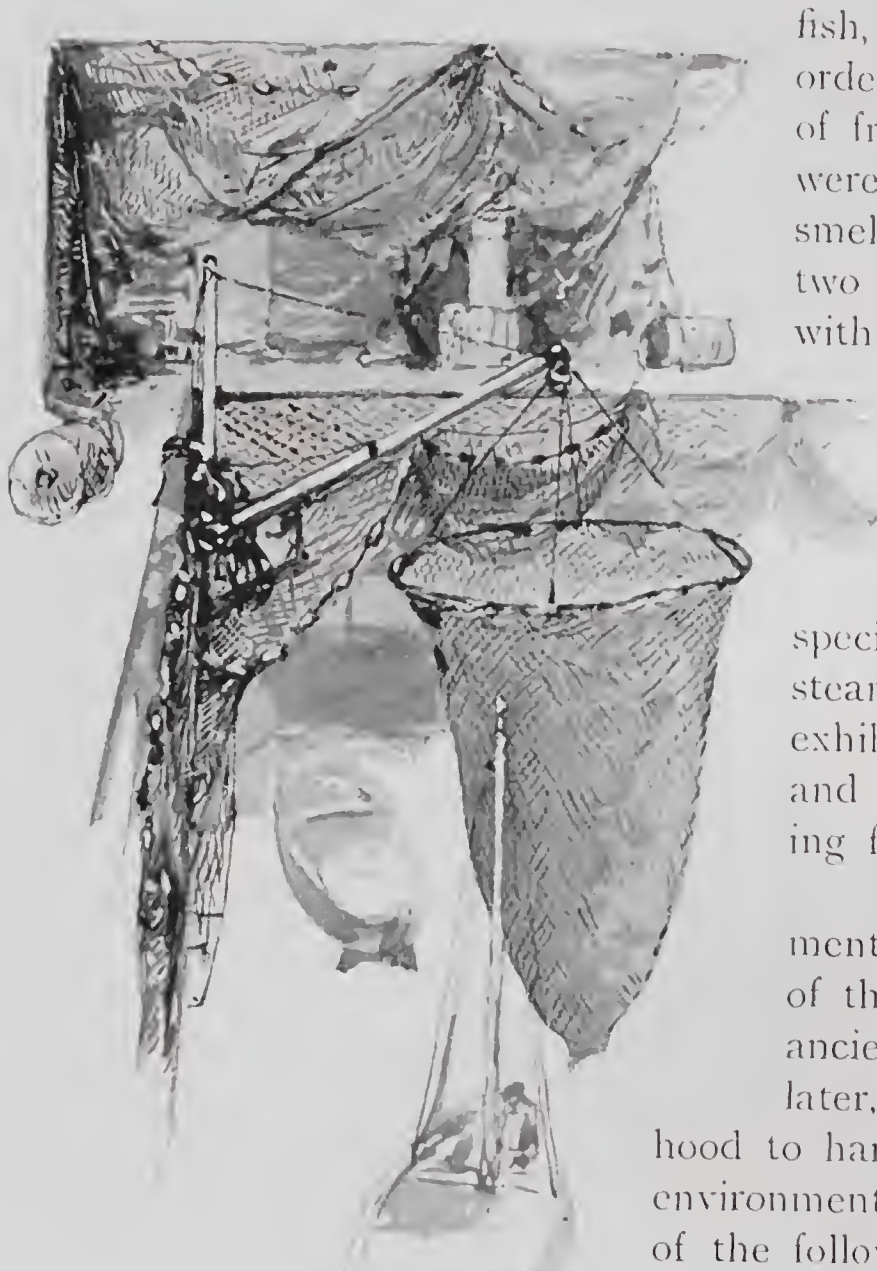
In this vicinity is the exhibit of the Boston firm of John R. Neal and company, in which are models of fishing vessels, and a large collection of traps, implements, seines and smaller nets, with a section of a mackerel seine side by side with illustrations of mackerel catching. There is also a large array of pictures illustrating the deep-sea fisheries of New England, with everything that pertains to the catching and curing of haddock, and the capture of cod and mackerel, including the position of the nets in the water, back of which are bunches of sea-weed and other marine specimens. Large maps show the principal lighthouses



LOOKING ACROSS THE GRAND BASIN TOWARD AGRICULTURAL BUILDING

from Cape Ann to Cape Cod, and from the latter point to Newfoundland the fishing-banks are distinctly located. Colored photographs reproduce the experiences of a fishing trip, and in graphic art are delineated the privations and hardships of the fisherman. Schooners are depicted amid the wintry seas of the north Atlantic, or lying in port with spars and rigging covered with ice, and with frost-stiffened sails that cannot be lowered.

So also are portrayed other phases of this great New England industry, in which are directly employed some 50,000 men and nearly half that number of boats and larger vessels, the value of the catch being not far short of $20,000,000 a year. In Boston markets alone were landed in 1892 more than 35,000 tons of fresh fish, haddock forming the greater part of the supply, and next, in the order named, cod, hake, pollock, and halibut. There were also 35 cargoes of frozen herring, while from points between Cape Cod and Nova Scotia were forwarded by steamer and railroad 5,000 tons of bream, flounder, smelt, mackerel, shad, blue-fish, salmon, and other varieties. In the first two months of 1893 the fishing craft of Boston harbor made 1,300 trips, with an average take of 15,000 pounds to the trip, this average falling far below the normal returns, for the winter was one of unusual severity.



SEINES AND NETS

In the southeastern part of the gallery the firm above mentioned has another collection of photographs, some of them representing famous craft among the fishing fleet, and in the centre of its enclosure, the front of which is draped with netting, is a fine specimen of photographic art, its theme representing the United States steamer *Atlantic* saluting the president. While only a private display, the exhibits of this firm present a vivid and faithful picture of New England and especially of Massachusetts fisheries in comprehensive and interesting form.

While as a state Massachusetts has no place in the Fisheries department, Gloucester, the harbor of Cape Ann and one of the largest centres of this industry in the United States, is worthily represented, as befits this ancient New England town. Founded in 1623, abandoned a year or two later, and permanently established in 1633, its colonists, inured from boyhood to hardship and privation, quickly overcame the disadvantages of their bleak environment. In the earlier portion of the following century it had taken the lead as a fishing port, building a fleet of vessels, among them the first schooner that ever sailed the seas, the story of which is thus related in Babson's *History of Gloucester*. "Captain Andrew Johnson," he says, "had built in 1713 a vessel which he had masted and rigged in a peculiar manner, the same as the schooners of the present day. When launched, the peculiar skipping motion she made as she glided into the water from the stocks caused one of the bystanders to exclaim, 'O how she scoons!' Robinson instantly replied, as he dashed a bottle of rum against her bows, 'a scooner let her be.' Since that time the same class of vessels have been called schooners." In 1879, about which time the Cape Ann fisheries gave forth their maximum yield, there were about 900 vessels employed, with more than 5,000 men, the catch for that year amounting to 35,000 tons.



PRODUCTS OF GLOUCESTER FISHERIES

In the Gloucester section, adjoining the rotunda of the Fisheries building, is everything that pertains to the fisheries which she controls, from the colonial era to the year in which we live. A large portion of her space is occupied by a harbor scene, representing a fleet of fishing vessels built between 1775 and 1893, among them the *Chebabaco*, launched in 1775, the *Handliner*, in 1840, the *Pinkey*, in 1810, and two English craft whose history dates from 1623, while of those of modern build there are many famous specimens.

The section is arranged in the form of an octagon, each face of which, except the one in the water, is surrounded by an arch, and over the enclosure thus formed is a canopy of nets and seines. The object of the exhibit is to show the chief industries of Gloucester in pleasing and instructive form, and to illustrate her progress as a fishing port during nearly three centuries of growth. Here is represented in miniature the primitive wharf of colonial days, with the old-time flake or platform, fashioned of sticks and supported by stanchions, on which

the cod were dried. Near by is the modern wharf, where the men are at work spreading the fish and packing them for market. All the most recent methods for handling fish are shown in contrast with those of the past. At the head of the wharf, or near it, are spacious fish, smoke, and salt houses; and by way of contrast as to methods of cleaning vessels is an ancient craft, carefully scrubbed and painted, near to a handsome George's bank schooner mounted on a ship-railway, the scrubbing and painting performed by modern processes.

But the most striking feature is a mast-head 40 feet high, the top-mast rising from the side of the section next the dome, and on the cross-tree a fisherman scanning the waters for a shoal of mackerel. In front of the arch facing the central fountain is the inscription "Gloucester, Mass., U. S," and on the capitals of the pillars which support it, the figures 1623 and 1893. On these pillars are statistics as to the cost, trips, catch, casualties, and other incidents relating to the fishing fleets, showing the amount of ice used, and fish and fish products distributed. In large photographs are depicted fishing scenes, the more pleasing phases in the lives of fishermen's families, and the buildings and environment of Gloucester.



A GLOUCESTER PILOT



HAND LINE, SINKERS, ETC

In the background of the exhibit are pyramids of boxes, barrels, and kits; canned fish in many forms, with fish in blocks, bricks, and tablets; smoked herring, mackerel, and pickled herring. There are also numerous devices for storing fish, with lines, nets, seines, trawls, buoys, and signals. Then comes a large assortment of fishermen's clothes, with tarpaulins, rowlocks, anchors of various sizes, patent windlasses, ice-crushers, fish-hooks, fish-knives, and, in a word, everything that pertains to fishing craft. An old American flag, with 27 stars, used on a fishing vessel threescore years ago, a large assortment of shells, sea-weeds, and curiosities gathered from ocean's depths complete this interesting collection.

A Gloucester firm has an exhibit adjoining the one described, including a large assortment of the products of its establishment, as glue preparations in barrels, cans, boxes, and jars, with papers, tags, and envelopes, so arranged as to demonstrate the adhesive qualities of fish glue. Elsewhere in its section leather is glued together, and pieces of wood are fastened to iron. There is also a display of fish mucilage, of guano made from salt fish, and of bone waste and ground fish-bones for fertilizing purposes.



CABINET OF FISHING GEAR

Fronting on the central nave in the southeastern section of the building is another exhibit by a Gloucester firm, consisting of fish glues and articles made therefrom. In the centre of its court is a pyramid of liquid glue in jars, bottles, and cases. In show-cases containing hats and shoes are indicated some of the uses to which this material can be put, and in one of the corners a large bell weighing over a ton is suspended in mid-air as a test of its tenacity. There are also wagon axles with the steel and iron joined by glue instead of by nails or bolts, and a large cannon is so suspended as to illustrate its adhesive qualities when applied to wood and leather. In a collection of fish skins are shown the special grades from which the glue is extracted.

In the northern gallery is an interesting collection from the whaling port of New Bedford, which, through its board of trade, sent to the World's Fair many curious specimens connected with that pursuit, from the apparatus used for capture to the process of oil refining. Here are shown among other articles, the old toggle iron,

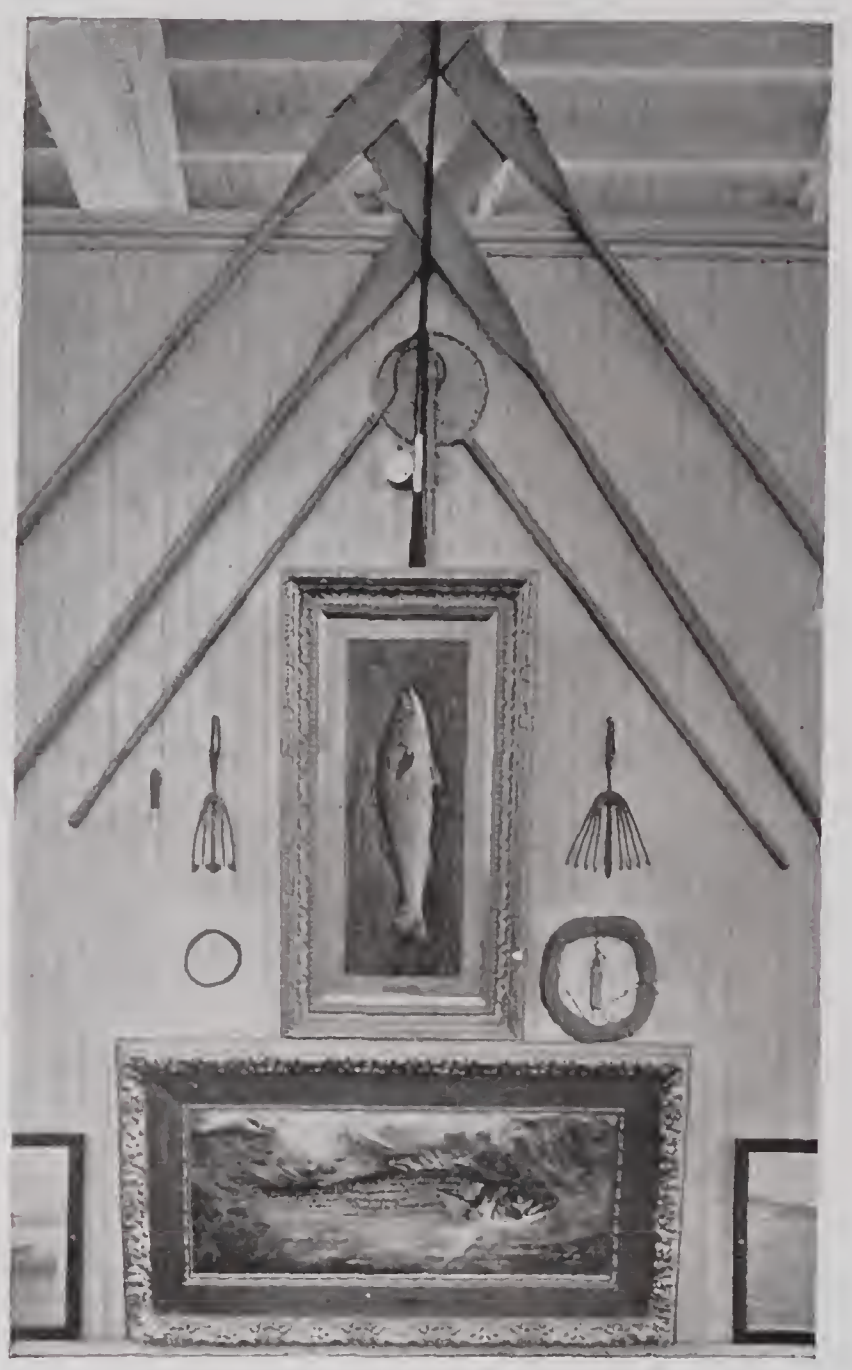
Pierce bom-gun, lance-gun, English gun harpoon, blubber gaff, hooks, ladles, and knives, with samples of whae oil and soap. On the walls are displayed in graphic art the perils of a whaler's life, and the whaling vessels and wharves of New Bedford, the former of old-time and modern architecture, including the *Progress*, now lying off the convent of La Rabida. There are also models of whaling vessels and the signals used at sea, groups of sperm-whale jaws, a large walrus head, an assortment of whalebone, and specimens of Arctic animals. To demonstrate the process of rendering oil, there are placed in the centre of one of the sections a large blubber tank, oil coolers, and a try kettle, as used on the deck of a whaler. Over the front of this court hangs an immense blubber hook, grasping a pair of whale jaws, and hanging from the gallery, suspended over the main floor, is a whaling boat completely equipped.



NEW ENGLAND TUNNEL POLE AND TRAP

Maine has a small exhibit adjacent to the rotunda, the principal purpose of which is to represent her marine and fresh water species. On the walls are mackerel, chub, haddock, striped-bass, sand-shark, codfish, herring, lobster, and other varieties, including such rare specimens as the tautog and lump-sucker. In the centre of the group is a handsome painting of a salmon, and a collection of shells from the sea coast graces the front portion of the enclosure, while to the right is an aërating pump, the invention of one of the state commissioners. Adjoining this section is a display of canned goods by a Portland firm, consisting of clams, lobsters, and other shell-fish in tins and bottles grouped in pyramidal form.

The state collection of Rhode Island occupies a liberal space in the Fisheries building, appearing to excellent advantage in the southern half of the central nave. Of the oysters taken from New England beds, valued at about $1,500,000 a year, a large proportion comes from that state, and another source of wealth is her manhaden fisheries, a species of the herring genus. Both industries are fully illustrated, everything that relates to the quest, capture, and preparation of fish for market being here displayed in models and graphic art. Among the former is one of the fishing steamer *George H. Humphrey*, showing remarkable fidelity of detail, and nicety of workmanship. Every particle of the vessel's equipment is reproduced, even to the rope which lowers the net, while down in the hold, carefully rolled away in tiny boats, are the finely knitted seines. From the mast is displayed the name of the steamer on a miniature flag, and near by is a model of the *Seven Brothers* on a less elaborate scale. Other models are those of a strike-boat and a cat-boat rigged and equipped for service in the scallop trade. In photographic form are represented many phases of the Rhode Island fisheries. In some of them are men setting, pursing, and gathering in the seines; in others are steamers towing heavy working boats, and there are sunset scenes on the water, with lighthouses in the distance, from paintings by eminent artists. Here also are shown the dwellings of the more prosperous fishermen of Tiverton, and in large, handsome paintings are grouped the choicest specimens from stream and ocean. Fronting on the nave is a famous boat, the story of which is told in the following inscription: "Presented to Ida Lewis, the heroine of Newport, Rhode Island, for her daring and successful efforts in saving human life in Newport harbor."



PORTION OF RHODE ISLAND'S EXHIBIT

In a large case is shown an improved scup-trap and a model of a purse-seine, for capturing minnows, the former a remarkable contrivance. In consists in part of a long leader, with poles and netting, the fish coming alongside and around the leader, and finally landing in an enclosure called the kitchen. Should

they swim ahead, the netting of another compartment is encountered, to which there is access through a square hole in the centre of the wall of netting which bulges in toward the kitchen. A large portion of the fish enter through this hole, thus reaching what is termed the parlor, and are thence transferred to the boat. To interpret the meaning of this device, small models of fish in metal are arranged in shoals, some having the appearance of swimming outside the leader, and others following them into the meshes of the trap. Near by is a miniature semblance of an old-fashioned trap, such as was in use half a century ago. Of hooks, rods, reels, nets, and tackle there is a large and varied exhibit, with a complete collection of oyster dredges, old and new, baskets, pots, rakes, measures, shovels, and other apparatus, showing how these fish are caught and handled. Tools for handling clams, spears for capturing lobsters, eel lanterns, sorting-boards, and luring nets are also among the minor features of the display.



CORNER OE MAINE SECTION

The state of New York is not represented in the Fisheries building, but the space assigned to her, east of Maine's collection is occupied by several of her metropolitan firms. The most elaborate display is that of Max Ams, in which are demonstrated the most improved methods of preparing and packing fish for market. In the centre of the court is a rowboat filled with mounted sturgeon from the Delaware river, to the right of which is a large assortment of caviare, Russian sardines, anchovies, and other fish, in cans and barrels. One side of the enclosure is banked with a variety of canned goods; another group consists of pickled lobsters, herrings, shrimps, American caviare, sturgeon oil, isinglass, and sturgeon fertilizers. In rear of this section is a pyramid of potted and bottled fish goods ready for exportation, and on one of the partition walls are depictured the fishing grounds of Bayside, New Jersey.



RHODE ISLAND APPARATUS

Adjoining this section are the exhibits of other New York firms, whose individual collections include sardines and Columbia river salmon in cans, and glues from the skins of cod and cusk, with apparatus for testing glues and a device for determining the adhesive quality of fish cement, the latter a recent invention. Other firms have a joint display of caviare, Russian sardine jam, Berliner roll herring, spiced sea-trout, and a large variety of other salt-water fish in cans, kegs, and jars ready for market. There is also a special exhibit of barrelled, boxed, and canned mackerel, and around the enclosure are views of sardine canning factories, showing process of cleaning, salting, packing, and the manufacture of cans and other articles.



FROM FOREIGN SHORES

To North Carolina a large and prominent section was awarded in the northern division of the Fisheries building; and here is a display well worthy of a state which in this as in other industries ranks among the foremost of the southern sisterhood. In her river and sea fisheries several thousand men are employed, and several hundred vessels, the yield of the former averaging from 12,000 to 15,000 tons a year, and of the latter, including oysters, more than half as much. Since the depletion of the Chesapeake oyster grounds, the North Carolina beds have gone far to supply the deficiency; the public interests are here carefully guarded, a commissioner, appointed for the purpose, frequently visiting the beds and capturing or driving away intruders, while armed patrolmen are constantly on the alert. In flavor, size, and shape, the oysters differ widely, a favorite species coming from the New river grounds, though others are largely in demand, and as is claimed are not inferior in quality.

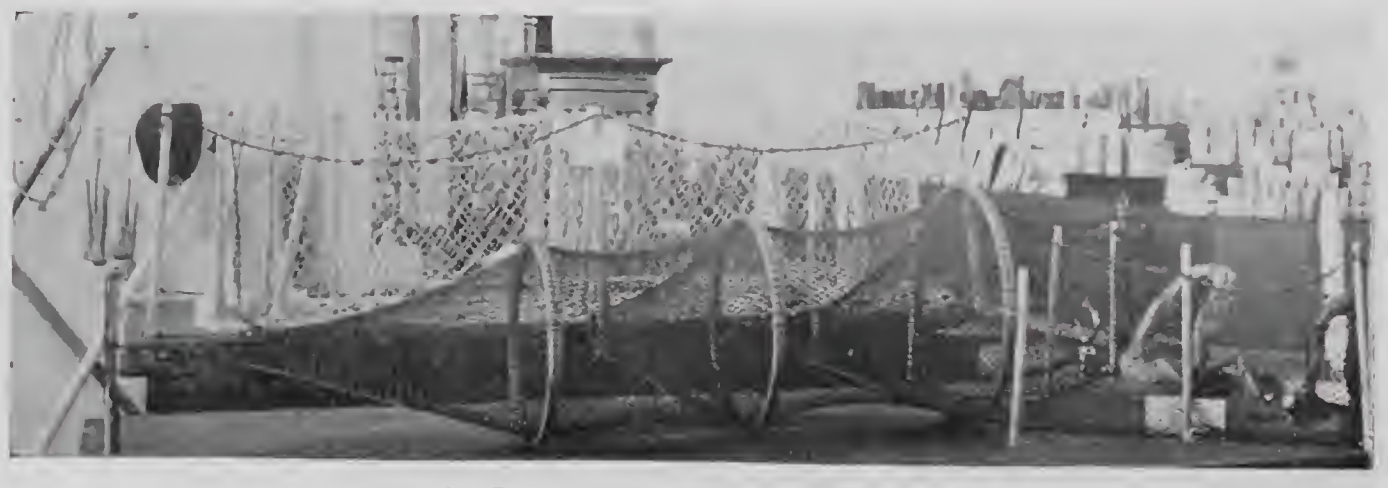


RUSH CAMP OF NORTH CAROLINA

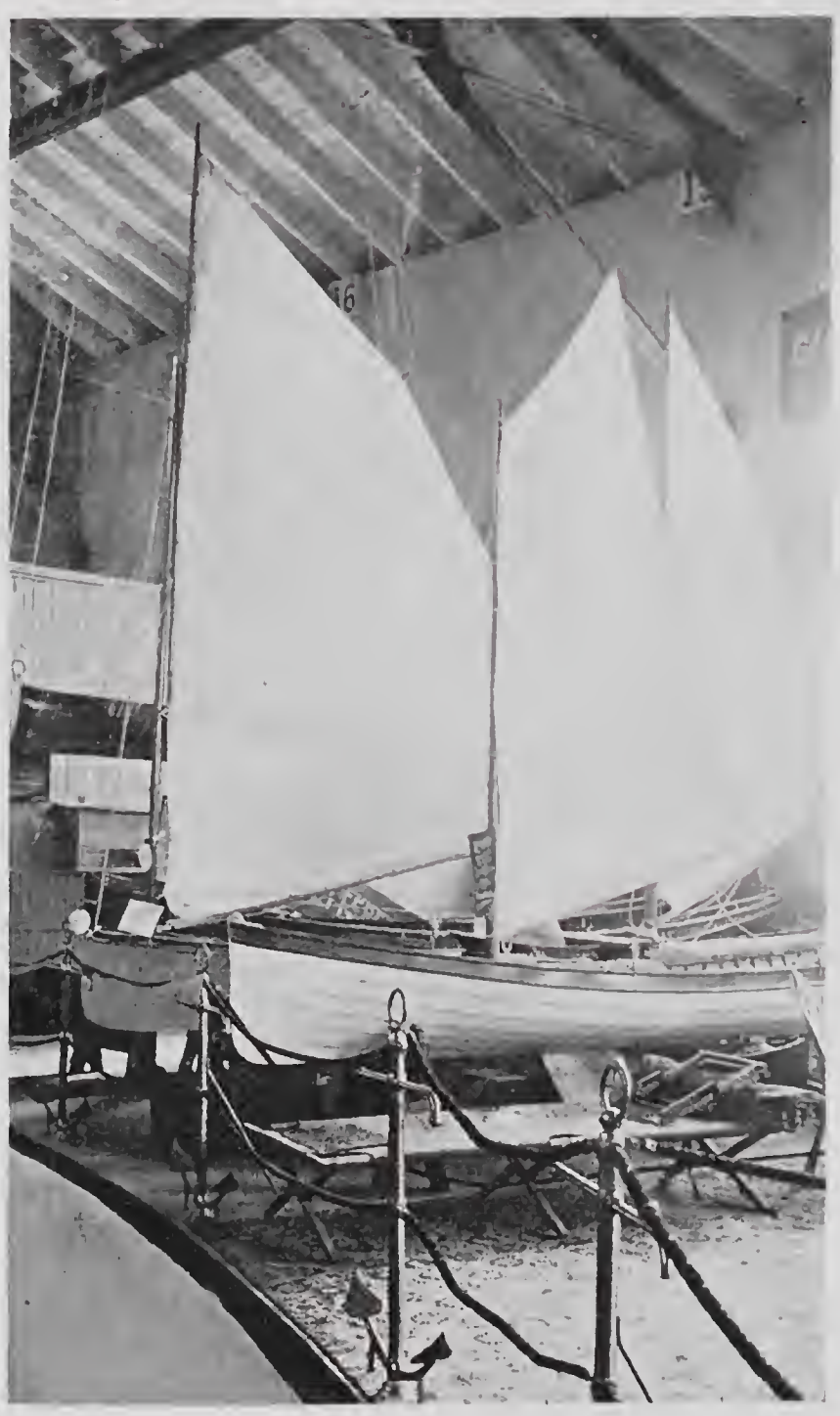
From grounds that cover many millions of acres, North Carolina sends numerous specimens of oysters and oyster shells, the latter freely distributed along the flooring of her court. From North river and Harper's ferry are collections of planted oysters, and from Beaufort one of little-neck clams. Here also is shown the diamond-backed terrapin, a delicacy much in demand, and of such value as to be artificially cultivated and protected by legislation. In the centre is a rush camp, such as serve for the homes of fishermen, shaded by palmettos as samples of forest growth. In photographs is reproduced a wide range of southern scenery, and there are many illustrations of the various phases of a fisherman's career.

One of the choicest collections of mounted fish and aquatic fowl in the Fisheries building is contained in cases at the eastern end of the court. This includes numerous specimens of the canvas back duck from the famous duck regions of Carrituck sound, with the heron, bittern, Canadian goose, and a cluster of grouse. The animal list is larger, comprising squirrels, minks, musk-rats, skunks, beavers, and large bull-frogs. In one of the cases are migratory fish, and in another fish of great economic value, as the herring, roe, and shad, with the gar, red-drum, manhaden, and other specimens prized for their fertilizing properties, while views of the guano factories show the process of its manufacture.

Among samples of food fish are the Spanish mackerel, pompano, black-bass, and mullet, with caviare prepared from the roe of the sturgeon for foreign export, and the fish of which isinglass is made. At the northern entrance are the jaws of the shark, and near the main portal is the head of a large spear-fish from the state museum, near which are harpoons for the capture of whales. Elsewhere are clam rakes and tongs, boat anchors and hooks, sound pulleys, and nets of many descriptions, with an Albemarle seine



FYKE NET NORTH CAROLINA SECTION



ILLINOIS SAIL BOATS

2,500 yards in length, here reproduced in miniature. On charts are outlined the principal fishing and oyster grounds, with statistics as to the various branches of North Carolinian fisheries.

Among the special exhibits in the Fisheries department may be mentioned a Louisiana alligator, twelve feet long, and the largest of two sent alive to the Fair as a contribution from that state. The change of temperature proved fatal to both, and the one on view was stuffed and mounted for exhibition on account of its enormous size.

Illinois is mainly represented by a Chicago packing firm, whose space, adjoining the northern portal, is indicated by a series of pillars, supported by oars, above which is a drapery of flags and net-work. Life-buoys extend along the entire front, and over the entrance is the head of a deer, decorated with bunting. Within is a large pyramid of canned oysters, with pillars of canned goods at the corners rising to the ceiling, and a base of oyster shells. Elsewhere are shrimps, salmon, and oysters in cans, shells from the Azores, finger-sponges, star-fish, sea corn, and egg cases of the sea-whelk or winkle. To illustrate the effect on wood of the toredo, or boring worm, an old tackle block is shown perforated with holes.

In this collection is a lobster weighing more than twenty-three pounds, the largest thus far recorded. A model of a dory shows the type of vessel used for lobster capture along the New England coast, other models representing a crate for holding lobsters while boiling, a modern lobster trap, and a floating car for keeping the fish alive while on their way to market. The different modes of shipping bulk oysters are demonstrated in a collection of cans, barrels, and pails of recent pattern, and there are photographs and paintings of scenes among the canneries, with fishing boats and a



ARCHITECTURAL DETAILS OF FISHERIES BUILDING

large wharf at Astoria, Oregon. By way of decoration are the heads of buffalo, elk, and reindeer on the further side of the court; in one of the corners is a small white baby seal. In the northern aisle of the gallery is another group of canned goods, including anchovies, lobsters, herring, and salmon.



PART OF OREGON'S EXHIBIT

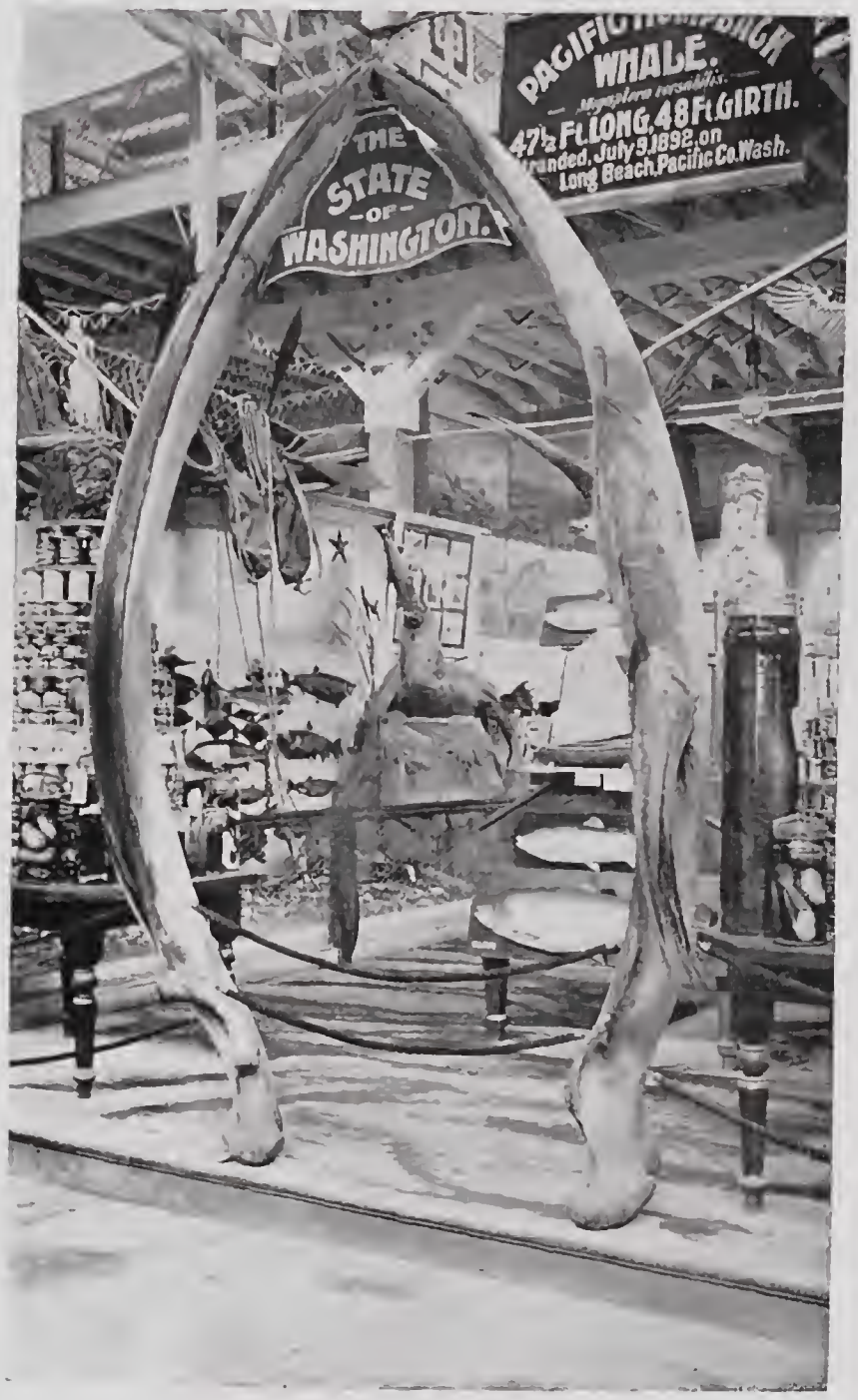
Minnesota's state exhibit, in the northeast corner of the building, consists of mounted specimens of fish and fish-eating birds, with maps, drawings, and photographs, showing the distribution and development of species, and matters pertaining to inland fisheries. The principal specimens are of the wall-eyed pike, red-horse sucker, big-mouth sun-fish, black buffalo, yellow perch, silver cat-fish, and spoon-billed sturgeon, while among birds are the cormorant, blue heron, black-tailed gadwit, bittern, upland plover, willow ptarmigan, and many varieties of grouse and ducks, the latter including the black mallard and great northern diver.

Around the cases containing these specimens are reproduced in photographic form the fish streams of Minnesota, the camp life of fishermen in early days, and phases of Indian life and habits. The state hatchery at Willowbrook, and the hatchery of the United States fish commission at Duluth, are given due prominence, as also are the commissioners. In the piscicultural department are drawings illustrating the various stages in the development of pike and perch. Above the collection of birds and fish is a large canoe, in which are seated two life-sized Indians, one guiding the boat and the other in the act of spearing a fish.

Fronting on the central transverse nave is California's small but choice display, consisting mainly of colored casts of her various food fishes. Among them are specimens of the king-salmon, orange rock-fish, white sea-bass, Sacramento pike, starry flounder, grass rock-fish, the scombridea, with such rare and peculiar species as the cabrilla, speckled scorpine, Spanish flag, and others; and as representing the entire coast, the jew-fish, pesca, vermiglia, striped bass, and a large mounted sturgeon. The members of these groups differ widely in size, shape, and color, giving to the entire collection a unique and novel appearance.



FROM SAN DIEGO, CALIFORNIA



JAWS OF WHALE, SECTION ENTRANCE

At the eastern end of the main building is the exhibit of the high school of San Diego county, California, in whose show-cases is a carefully selected assortment of star-fish, corals, sea-moss, pearl and other shells, with many beautiful articles made therefrom. Near these are groups of crabs, horned toads, abalones, shark's jaws, shark's eggs, and the ear-drum of a whale. In another division, extending the entire length of the space, is a great variety of fish-eating birds, as the curlew, butter-ball, American white pelican, and road runner. There is also a large collection of San Diego fish, both mounted and dried, including the salmon, white-fish, rock-cod, croaker, black-perch, and blue-fish. The leopard shark and devil fish are here on exposition, and there are many fancy articles skilfully fashioned of scales, shells, and seaweed, with other rare articles scattered so liberally throughout the exhibit as almost to give to it the appearance of ocean's bed. A large picture of San Diego and the surrounding country, showing Coronado beach, National city, the table lands of Mexico, and the snow-capped mountains of Cuyamaca,



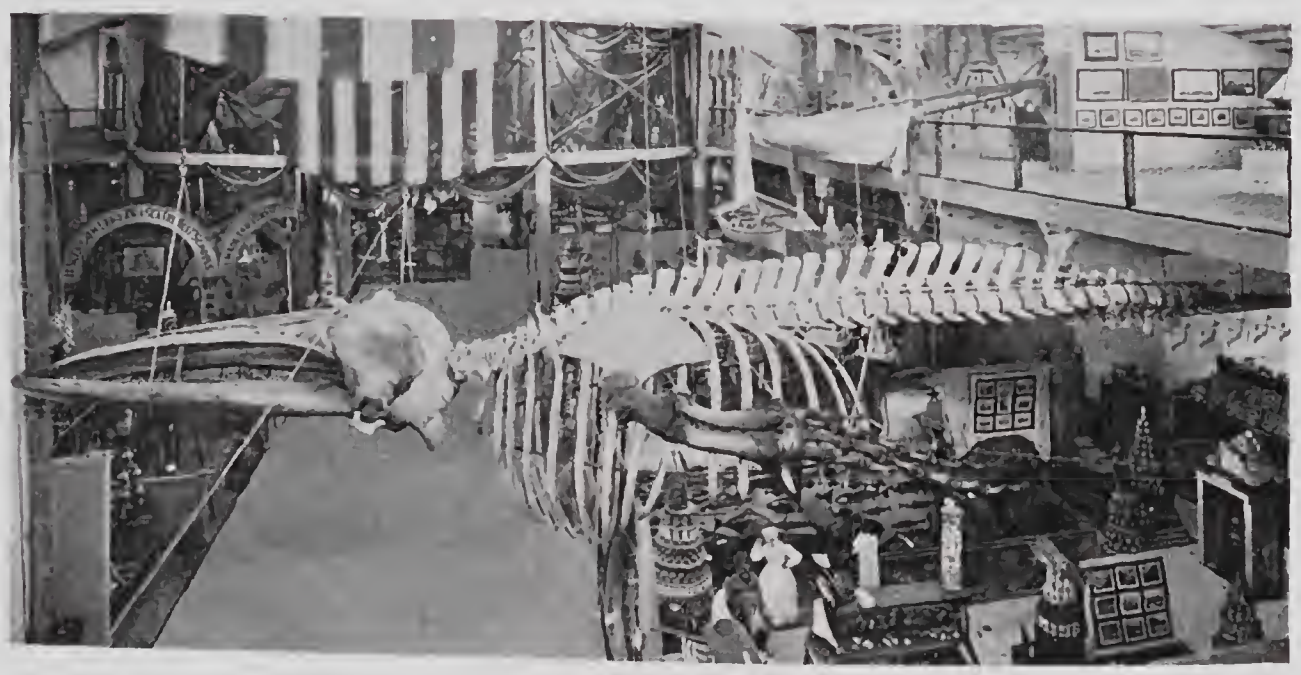
A FEAST OF SALMON, WASHINGTON EXHIBIT

serves as a background covering the surface of the partition wall.

Oregon's display consists mainly of canned salmon, in the form of pyramids, the joint exhibit of the leading packing houses of Astoria. A model of a salmon boat, fully equipped, and a patent scoop, or salmon wheel, show the method of capturing salmon on the Columbia river. Finely preserved specimens of salmon are here, as also are clams, red trout, porgies, and blue-back bass. A case of pheasants and a picture of Mount Hood in the background form pleasing additions to the display. There is also a picture showing an Astoria fishing fleet returning from the grounds with a heavy catch, near to which is a fur-seal, weighing over 1,200 pounds. To Oregon was assigned an additional section in the east gallery, where was placed an assortment of canned salmon and fish packed in various forms.

Above Washington's enclosure, adjacent to Oregon, was suspended the skeleton of a whale, its jaws forming an archway at the entrance of the court. The exhibit consists largely of canned goods, including salmon, sturgeon, crabs, and lobsters. Of fish destroying birds, the eagle, whistling swan, and North American bittern are the largest and most voracious specimens. In well preserved specimens are also the wolf-fish, salmon, dolly-varden fish, trout, squid, and other river and ocean species. Oysters, native and acclimatized, mussels, clams, of the short-neck, razor-back, and mammoth varieties are well represented. There are likewise shrimps, cockles, and a large collection of mounted fish, as white sturgeon, star-fish, chinook, blue-perch, flounder, rock-cod, white-perch, sculpin, and salmon in every form.

In the centre of the court are models of fishing-boats, including one with its outfit occupied by the Makah and other Indians who captured the Exposition whale, together with the relics and fishing implements of various Indian tribes. A mixed collection includes shells, barnacles, sea-weeds, and other ocean products, with harpoons and various implements made of bones and skins, while poised erect at the rear of the enclosure, with a fish in its mouth, is a large sea-lion from the Columbia river, whose scenery and fishing industries are reproduced in photographic form.

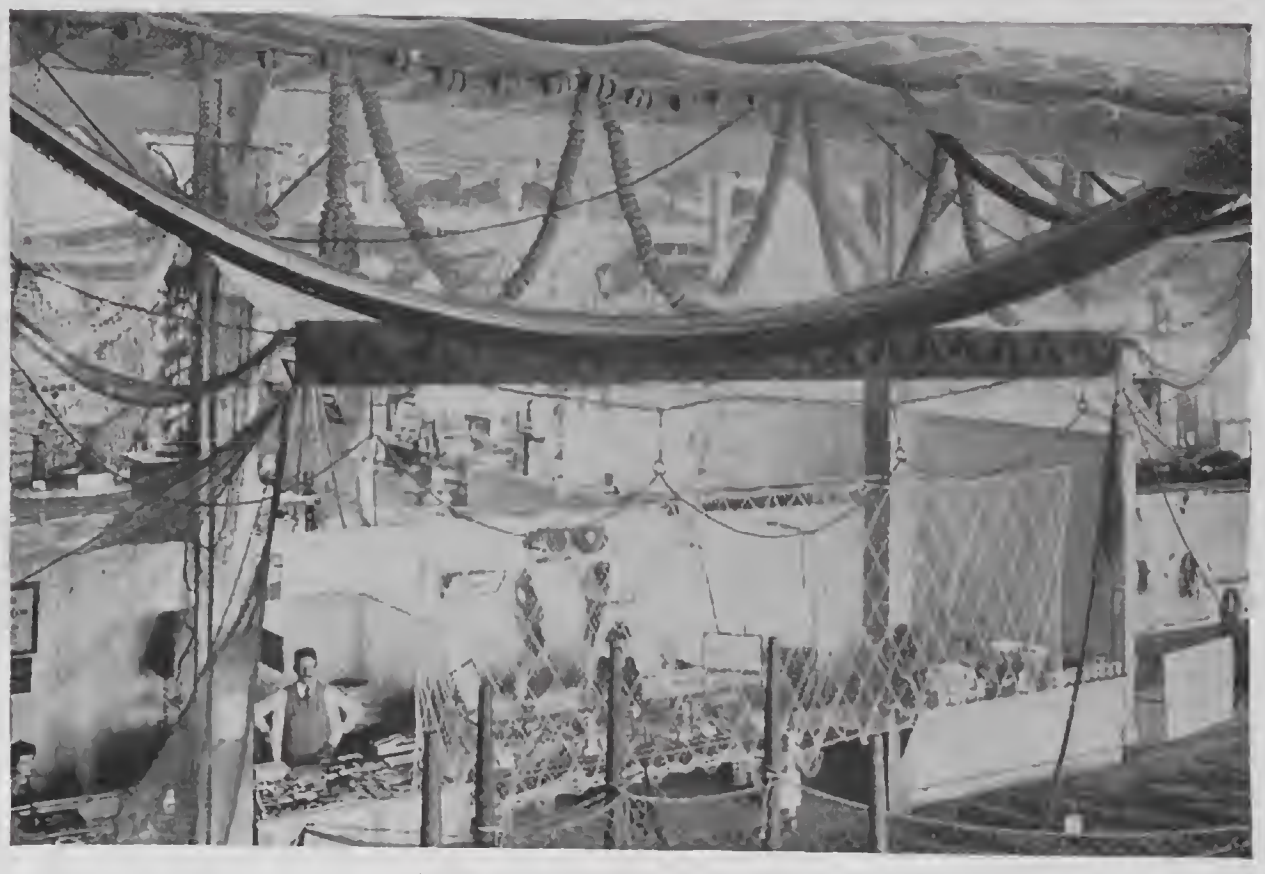


SKELETON OF A WHALE

Salmon taken from the Columbia river form the mainstay of the Oregon and Washington fisheries, and were introduced into foreign markets long before canneries were established by American citizens. From about 21,000 cases in 1869, the pack increased to 629,000 cases in 1883, when the maximum yield was reached, the catch thenceforth diminishing with the rapid depletion of the fisheries. Meanwhile the export trade, beginning with 30,000 cases in 1871, rose to 479,000 cases in 1876, realizing more than $2,500,000. Of Alaska, though not represented at the Fair, it may here be stated that her canneries bid fair to rival those of the Columbia, their output showing a steady gain, and gradually finding favor among eastern and European communities.

Among foreign exhibitors Norway occupies a large and prominent section on the northwestern floor of the

Fisheries building, where is well represented an industry in which one-fifth of the population is directly employed or interested, one that forms a large portion of the food supply, and with a considerable surplus for export. Here sea-fishing is conducted almost entirely off the coast, and in open boats, owned for the most part by the fishermen themselves. At the Lofoden grounds, in the far northwest, the largest of Norwegian fisheries, 30,000 men assemble, with 7,000 or 8,000 boats, and of their cabins, built among a group of islands within the Arctic circle, a specimen in Norway's court serves as the office of this department. Though here, as elsewhere, storms prevail for about one-half of the season, the catch in fine weather is phenomenal, the take of cod being estimated at 56,000,000 a year. Herring and mackerel, of which there are several species, are next in economic value, and among others the salmon, whale, and seal fisheries swell the total exportation of fish and fish products to $12,000,000 a year.



WITHIN THE FISHERIES BUILDING

In front of the Norwegian court is a series of pillars, adorned with flags, and between them a drapery of netting, with net-buoys and other objects of interest. At the entrance is an arch formed of boat-oars tastefully decorated, with the word "Norway" conspicuously displayed, and above it the crown of Norway resting upon the royal coat of arms. The court is in two sections, divided by the northern aisle, each section being in several compartments. To the left of the entrance is the fisherman's cabin referred to, a red colored structure, with small windows and a cosy fireplace. The exhibits cover the entire fisheries of Norway, and especially to deep-water fishermen, are of surpassing interest. Everything relating thereto is arranged in artistic forms, both as to fish, appliances used for their capture, and all the various uses to which the product is applied. In the foreground is an historical collection of models of fishing craft, beginning with the staunch, unwieldy boats used by Norsemen many centuries before the Columbian era. All are of full size, completely equipped, and show every known device for catching fish. Among the models of modern craft are whaling, cod, and herring boats, manned and with every kind of apparatus used in localities ranging from the whale and seal fisheries of the north to the mackerel grounds of the southern peninsula. There is also a model of a whaling steamer, on the upper deck of which is a miniature cannon, with bomb-harpoon and a complete equipment for catching the bottle-nose whale. Here also is a model of an improved foghorn, differing from all others in that the air is pumped into one side of a square box, from which on becoming surcharged it escapes through a horn on the other side, with a sound that can be heard for a distance of several miles.



FISH OF THE FAR NORTHWEST



ORIENTAL FISHING BOAT

Along the wall of this section are plaster casts of Norwegian fishes, including the hake, ling, flounder, lemon-sole, herring, shad, plaice, turbot, whiting, mackerel, polar red-fish, lump-sucker, eel, gray gurnard, and many other varieties. In boxes, cans, and kegs is an assortment of fish in marketable forms, and on the centre of the wall is a large oil painting, the theme of which is a gale off the northwest coast of Norway.

In another section, separated by a long row of pillars reaching from ground floor to gallery ceiling, is a valuable collection of specimen products of Norway fisheries, displaying in separate jars, first the fish, then the oil, scrap, and bones the two last also in the form of fertilizers,

Meal made of fish is among the collection, and around the pillars are piles of bloaters, mackerel, herring, anchovies, cod, and so forth. In tiers, one above another, rising to the roof, are samples of dried and pickled fish, and dried back-bones of cod; and in other groups are barrelled and canned fish, and the salted roe of the cod and mackerel. In addition to the products of the whale and seal, are isinglass, oils for medicinal purposes, boiled cod, preserved fish, meat, and game, and potted omelets and roes. A fine display of cod liver oil comes from Lofoden and other fishing centres. The Modums fishing association displays its piscicultural apparatus, and a large collection of skin and oil clothing shows how fishermen dress in various localities along the coast. An instructive exhibit is from the Exposition committee at Bergen, with various well developed



VIEW IN NORWEGIAN SECTION

specimens contained in bottles, by the side of which are the results of a careful analysis, showing among other items the percentage of potash, water, and lime contained therein. The same association shows the salted skin of a Greenland whale, a tanned wolf's skin, seal skins dressed with alum, and a reindeer's skin with head and horns attached.

North of the aisle which divides the court the remainder of the exhibits are arranged in convenient groups along the walls, the canned goods including stock-fish, split fish, preserved shredded fish, and preparations of jellies and sauces, with monster cases from every noted fish mart in Norway. In other sub-divisions, enclosed by screens and railings, are the exhibits of the Bergen committee, which has still another collection of fish products, in more than fifty varieties, with improved fishing implements, anglers' outfits, nets for catching every kind of fish on the coast, buoys and beacons, gaffs, sinkers, seines, weirs, lobster and eel traps. There is also a patent winch, a contrivance for hauling in cod and herring nets, and one that can be used for hoisting sails and masts. In another case is a large variety of lines, and near by a whale harpoon, with cannon and shells. A third group consists of artificial bait; and there is an interesting collection of hooks, dating from the year 1797.

The exhibit of aquatic birds by the Bergen committee includes the eider duck, of which there are many specimens, the yellow-legged gull, the diver, cormorant, guillemot, and ouzel, while the effect is greatly enhanced by beautiful quilts made of eider down. A large polar bear, in the act of catching a seal, forms the central figure of the section. Photographs and sketches, giving a panoramic view of the coast, show the various fisheries and harbors, and Norwegian game fish are freely illustrated. On statistical charts are represented in colored circles the amount and value of the catch at each station from 1866 to 1890, with other data relating



SAIL BOATS

to the fisheries. Here also a private firm has samples of cod-livers in various stages of growth, and near it are various grades of cod-liver oil, with models of refining apparatus and a cod-fishing boat, and photographs illustrating these fisheries.

By the Bergen committee is also displayed a collection of shells, sea-weeds, sponges, corals, and marine curiosities.



MODELS OF BOATS

Models of fish curing and canning establishments, show the processes of drying, salting, smoking, trimming, and cooking, while appliances for preserving fish during transportation are also reproduced in models. By the fishery association of Modums is exhibited a model of a fish-hatching apparatus, with vessels for catching the roe and fry in different stages of development, and breeding and rearing establishments for oysters and other shell-fish. Around the walls are pen and ink drawings of fishing scenes in northern waters, and a large painting of Arctic scenery, with icebergs, and a party of hunters on ice-floes in the act of spearing seals.



NORWEGIAN FISHING CRAFT

In the gallery, the first two sections on the north side are occupied by an exhibit of Norwegian seines, nets, lines, and a large assortment of dried fish. The sections along the west end contain numerous implements for fishing, and appliances for handling and transporting fish to market, with floats, buoys, sinkers, and other apparatus. The entire enclosure is draped with netting, copiously decorated with flags and emblems, and across the entrance is the national coat of arms.

Great Britain has a small but choice display adjoining the western entrance of the Fisheries building. To the right of the enclosure is a Scotch exhibit of salmon flies in a handsome gilt case, and another Scotchman illustrates in diagram form the method of electric communication with fishing fleets at sea. The latter shows first the electric signal cabin ashore, and then the submarine cable, extending from shore to within a convenient distance of the fishing grounds, where it is moored to a terminal buoy. There are also beacon buoys, carrying metal flags to indicate the course, and at both ends are electric bells. A novel feature is that the cable can be picked up by means of a grappling hook, and messages sent ashore from any point. Near by are plans and diagrams of ice houses, models of railway cars for conveying fish to market, and of the boxes in which they are packed. Another series of diagrams show a fisherman's portable bothy, adapted to the herring grounds on the coast of Scotland. The structure is built of undressed wood, and rests on a mound of rock; its roof is of corrugated iron, and its floor of earth, ventilation being from above. Other designs by the same exhibitor are in the form of permanent dwellings for fishermen.

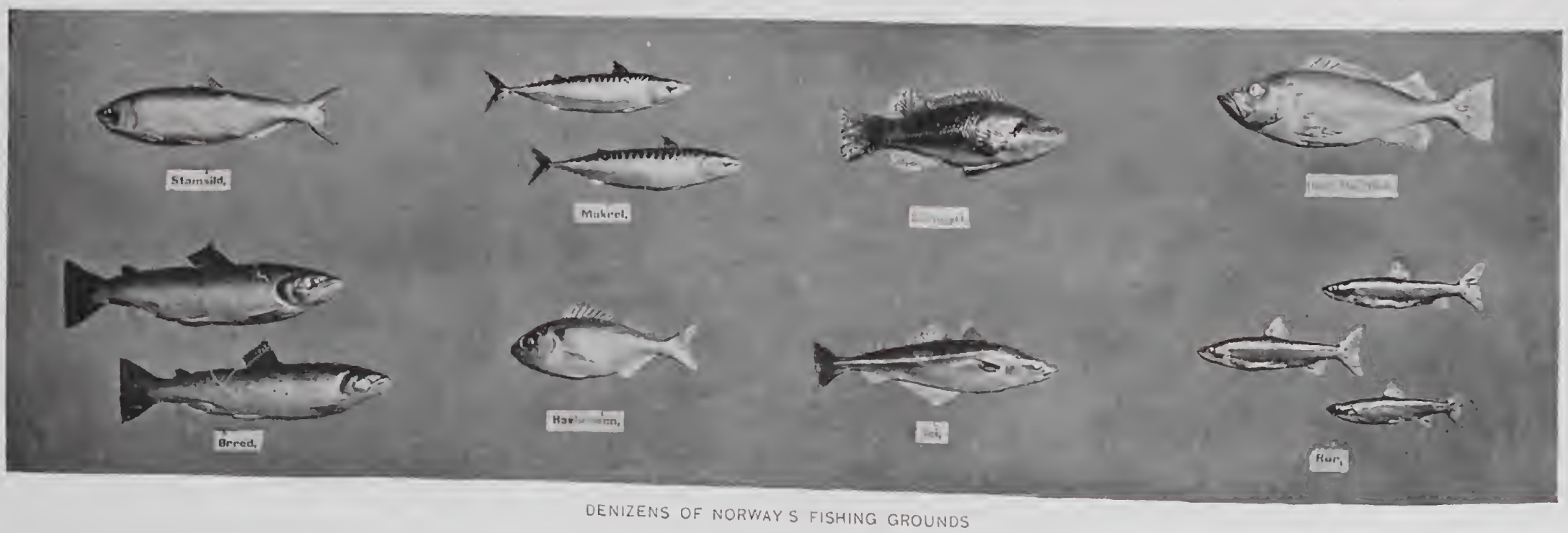


COD LIVER OIL



ANCHOVIES FROM NORWAY

From a prominent fish-curing establishment of Scotland is an exhibit of finnan haddies, sun-dried cod, saith and ling, cured fish and barrelled herrings, the last also displayed by a Glasgow firm. A London house has a large collection of India rubber goods, as waders, fishing trousers, boots, overalls, and various articles pertaining to the outfit of sporting fishermen. London has also an elaborate assortment of hooks, from those which catch the whale to such as are used for the capture of minnows; together with an assortment of flies, needles, prongs, and lines. Decoys, as worms, toads, reptiles, and butterflies are arranged in various forms, and a



DENIZENS OF NORWAY'S FISHING GROUNDS

number of gold medals shows the exhibitor's standing at previous expositions. Still another English firm has a collection of hooks for both sea and river use, and adapted to the fisheries of every land.

Occupying nearly one-third of the British space is a model of the Baltimore fishery school, in the county of Cork, Ireland, the special contribution of Baroness Burdett-Coutts, who was one of the founders of the

school, and formally opened it in 1887. Here is shown how the pupils are taught all the arts relating to fishing and fish curing, with their dormitories, class-rooms, and net-making and mounting rooms. The special object is to explain what is being done to revive the fishing industry in a district where it had become almost extinct. The model is twenty feet square, and stands for Ireland's part in the fisheries exhibit of Great Britain.

While not wanting in attractive features, the British display affords no adequate representation of an industry in which England far outstrips all other countries in the world. From the fishing ports of the United Kingdom more than 400,000 tons of fish a year are conveyed inland by rail, and including shell-fish the value of the annual catch is not far short of $40,000,000. Yet even this enormous yield does not suffice for home consumption, imports of fish amounting to nearly $15,000,000 a year, against $8,000,000 or $10,000,000 of exports. The number of men employed is almost as large as the standing army of Great Britain, probably exceeding 125,000, with 30,000 registered boats, the Scotch contributing the larger proportion; for the fisheries of Scotland produce almost as abundantly as those of England, though with a smaller relative value.



CANNED GOODS FROM SCANDINAVIA

No less remarkable is the yield of Canadian fisheries, estimated for 1892 at $20,000,000, or one-half of the British production, though the population of the kingdom is more than seven-fold that of the dominion. Cod ranks first in commercial value, with a take for that season worth $4,000,000, and next are salmon, worth $2,500,000; herring and lobsters, each $2,000,000, and mackerel, $1,500,000. In these and other fisheries are employed about 65,000 men, with more than 30,000 boats and 1,200 larger craft, while of nets and seines there are several million fathoms.



PRODUCTS OF NORTHERN FISHERIES

The fisheries of Canada are among the richest and most extensive in the world, reaching, on the Atlantic coast, from the strait of Belle Isle to the bay of Fundy, and together with British Columbian shores affording 12,000 miles of ocean seaboard. Add to this the inland waters of the great lakes, of Manitoba and the Northwest territories, with rivers and streams abounding in fish in many portions of the dominion, and we have a source of wealth, as yet but partially developed, second only to her agricultural resources. Herring, mackerel, and smelt are captured in immense quantities along the seaboard of the maritime provinces; British Columbia yields, in addition to other varieties, 2,500,000 a year of salmon, and the inland waters of the dominion team with white-fish, trout, sturgeon, bass, and pickerel, the take of the first alone exceeding 23,000,000 pounds. Oysters are found in abundance in Nova Scotia, New Brunswick, and Prince Edward island, and the lobster canning industry, beginning in 1869 with a production worth $15,000, had increased by 1881 to its maximum value of $3,000,000, with more than 600 canneries still in operation.

Protected by laws that are rigidly enforced with the aid of armed cruisers and a large force of officials, the Canadian fisheries are in no danger of depletion, while in the several provinces thirteen hatcheries increase the natural reproduction, 140,000,000 fry, mainly of salmon, salmon-trout, white-fish, and lobsters being planted in the single year of 1892.

A large trophy in the southwestern section of the Fisheries building marks the starting point of Canada's exhibit, where around a lofty octagonal pagoda are arranged in tiers the various products of ocean, river, and lake. Seines of all sizes and of finished workmanship are abundantly displayed, and above all is the figure of a tall Canadian fisherman. The groups are classed in five divisions, one for each of the provinces, occupying a total space of 7,000 square feet, and forming as a collective exhibit one of the strongest features in the department.



PORTION OF THE GREAT CANADIAN SECTION



BOAT PRESENTED TO IDA LEWIS



HOODED SEALS, GULF OF ST LAWRENCE

The greater part of the Canadian display is from the Marine and Fisheries department at Ottawa, whence the dominion government has forwarded many valuable specimens, including mounted fish and fish-destroying birds and beasts; salted, smoked, and frozen fish; seal, whale, and other fish oils; algæ, sponges, and crustacea; hooks, seines, nets, and fishing gear of all descriptions. In the front section is one of the birch bark canoes of the Micmac Indians, of New Brunswick, and near by are the canoe and dug-out of the British Columbian Indian, in contrast with which is a fishing boat from Nova Scotia, with models of other sail and steam boats. The Hockins fish-way and a lighthouse, with nine large reflectors, recently constructed near Montreal, are also shown in models. The former is unlike anything of the kind on exposition, and is best described in the words of the official in charge of Canada's exhibit. "It resembles," he says, "a hole in the bottom of a dam, with the velocity of the discharge so reduced that a fish may go against the current and swim into the pond above. It consists of a series of apartments having approximately a level floor, with side walls and transverse partitions every four feet of its length, from the bottom of the dam to above the water line. These apartments are connected with one another and with the pond above and the river below the dam. The water in the several apartments will be lower step by step from inflow to outlet, and flows out of the last aperture under the head of about two feet. Fish can easily make their way from the first apartment to those above, and it is so built up from the bottom of the pond that the ice cannot form under it." In photographs are illustrated fishing episodes along the Fraser river, Indian modes of fishing, and the scenic wonders of Vancouver island.



REPTILES PRESERVED IN ALCOHOL, NEW SOUTH WALES

In an adjacent court are cans of Fraser river salmon, with photographs of New Brunswick scenery, and of fish hatcheries at Quebec and Halifax, a separate group showing the famous Ontario hatchery, with its museum and underground chamber. Fishing craft of many types are reproduced in models, as also are the vessels used for protective purposes, and a steamer forging its way through the ice of subarctic seas. There are specimens of the larger fish for which Canada is famous, among them a halibut weighing 300 pounds, a Greenland shark, and monsters of the deep from the gulf of St Lawrence, including the rare white whale, a ton or more in weight. In one of the cases are the sharp-nosed sturgeon, wolf-fish, and a pair of baby seals; and among the finest specimens of mounted fish are the quinat salmon from British Columbia and the Atlantic salmon from Nova Scotian waters, near which are otter, mink, and an Ontario beaver. In mounted samples the dominion is especially strong, including the yellow perch, salmon-trout, and many varieties of lake suckers from Ontario; sturgeon, salmon, and bass from Quebec; shad and sun-fish from New



PART OF NEW SOUTH WALES DISPLAY

Brunswick; cod from Nova Scotia; buffalo-fish from Winnipeg, and ling, rock trout, green cod, and others from British Columbia. Inland waters are also represented, as by the cod of the St Lawrence, the sheepshead of the Detroit, the cat-fish of the Red river, and the salmon, trout, and white-fish of the great lakes.

In other cases is a choice collection of preserved specimens from every quarter of the dominion. Nets, lines, and traps are freely displayed; there are assortments of whalebone, of sturgeons' sounds, and of lobsters from British Columbia, whose sealing fleets are shown in photographs, and among curiosities are an old sealing musket and the tusk of a narwahl from the Hudson Bay region. An attractive feature is the collection of shells, contributed from all the provinces. From the marquis of Lorne comes an assortment of barnacles gathered from the neighborhood of Victoria, and a Montreal exhibitor has a display of river crustacea. Among the specimens preserved in alcohol are squid, starry rae, horse-mussels, sculpin, and lobsters more than two feet long; while of fish in commercial forms there are herring, cod, and salmon in cans and barrels.



COLUMN OF FRENCH SARDINES

Fishing craft and their models are also among the attractions of the Canadian courts. In the front section there are, in addition to those already mentioned, models of the government vessels which protect the cod banks of Newfoundland, and of such as are engaged in those fisheries. By a Nova Scotian firm is shown the counterpart of a Newfoundland fishing schooner displayed in London at the fisheries exhibition of 1883, and afterward purchased by the prince of Wales. Her sails are set, and on every side are groups of fish, with modern implements and gear of every kind, in contrast with which is the primitive fishing apparatus of Canadian Indians. Of seals there are several specimens facing the central nave, and of shell-fish there is no lack, with oysters, clams, crabs, and lobsters of remarkable size and quality. Here also is the largest devil-fish ever placed on exposition, and to fish products, as oils and skins, is given a conspicuous place.

The entrance to the principal court is in the form of an archway composed of canned fish with bottled goods inside the pillars, and at the top a panel formed of fish products. The interior is draped with netting, flags, and bunting, and on the columns are the dominion and provincial coats of arms. In the southern gallery Canada has also several sections, and here again in scores of cases are numerous specimens of mounted fish and fish-destroying birds, but without a single duplicate. Fish, fish stories, and fishing scenes are likewise portrayed in graphic art. But here the centre of attraction is a model of a fishing station, with coast line and piers, warehouses, stores, and dwellings, resembling a seaport town in miniature. Finally it may be said that the entire exhibit is in all respects worthy of the dominion, one on a larger and more comprehensive scale than any before attempted, and yet, as is said, with an overflow of specimens offered for exposition that would have filled at least one-half of the Fisheries building.



MODELS OF RUSSIAN BOATS

Adjacent on the west to Canada's display is that of a country from which she is separated by half the circumference of the globe—the British colony of New South Wales. This is also a most interesting feature in the Fisheries department; for while less elaborate than that of the dominion, the majority of visitors will here for the first time be informed as to the vast resources of Australian fisheries. Many of the specimens are taken from the waters of Sydney harbor and the grounds adjacent, where are some of the most prolific fisheries in the world. Among the principal food fish are the schnapper, bream, rock-cod, gar-fish, mullet, mackerel, and whiting. The first is a favorite pan fish, with firm, white flesh of excellent flavor, and weighing when full grown from six to nine pounds, though twenty-pound schnappers are by no means rare. It is found in vast shoals along the entire

eastern coast of the southern continent, and is one of the most voracious of fish, greedily seizing the bait, and taken by hook and line at all seasons of the year. The bream is second in flavor only to the schnapper, and by many the gar-fish and the red and black rock-cod are preferred to either. Of mullet there are several varieties, the sea mullet resembling the Scotch salmon in taste and fibre, and of astonishing fecundity, the roe of the female containing more than 2,000,000 eggs. About Christmas week—the Australian midsummer—and for several weeks thereafter, the expanse of ocean is partly covered by migrating schools of mackerel. The whiting has no affinity to the European species, but is of superior quality, and when lightly cured and smoked is esteemed as a table delicacy. Then there are the coarse grained jew and king-fish, the salmon, unworthy of its name, and of which only the roe is eaten, the herring, of excellent flavor but little used for food, the perch and flat-head, the latter with white, flaky flesh, the flounder and sole; while among crustacea the cray-fish is not inferior to the American lobster, and oysters and other mollusks abound in every bay and inlet.



HERRING FISHING BY THE DUTCH

With all this wealth of fisheries it is somewhat remarkable that New South Wales imports from abroad more than three fourths of her entire consumption, about $200,000 representing the value of fresh fish sold in Sydney markets against $650,000 worth of imported fish preserved in various forms. This is due mainly to high prices caused by the rapid depletion of the grounds within and adjacent to Port Jackson, for as a rule the colonial fisherman will not venture more than a mile or two from Sydney heads, and experienced sea-going fishermen supplied with modern implements are almost unknown in Australian waters. The appliances used are the same as did service half a century ago, and the field is still restricted to grounds that have been worked for several score of years, a seine and meshing-net with a rickety open boat forming the entire outfit. There is not a fishing steamer or even a fishing smack in all the Australian colonies, and apart from the most primitive apparatus, there is no provision for deep-sea fishing of any kind. Here in truth is an outlet for foreign capital and enterprise, one capable of infinite development and offering sure and speedy returns; for while there is no country in the world with richer resources in this direction, there is none where these resources have been so much neglected and mismanaged.



TANNED FISH SKINS, RUSSIAN SECTION



RUSSIAN FISHING NETS

To make known the latent wealth of Australian fisheries, their products, methods, and results, was the special object of the colonial government of New South Wales. To this end are shown several groups of canned goods, and of marine and fresh water fish preserved in alcohol, as schnapper, whiting, rock-cod, flounder, gar-fish, flat-head, and an assortment of dried fish and fish oils. There is also a large display of pearl and oyster shells, some of the latter



GIANT CRAB OF JAPAN

clinging to bars of iron as found in ocean's bed, and in another group are fish fertilizers and soaps. In cases on either side of the court are mounted specimens of fish-eating birds, as the fish-hawk, cormorant, shag, large-billed bittern, gray heron, and sea-gull. A careful collection has been made of the reptiles of the colonies, and of these there are many hundreds preserved in alcohol. Australian smoked fish occupy a large space in the rear of the section, near which are cabinets of shells, reptiles, and marine fish from the Sydney museum.

On the left of the court is a small yacht, made of Australian wood, equipped as a pleasure craft for amateur fishermen, and near the entrance is a model of a twenty-two foot fishing boat. The west wall is covered with a series of paintings of marine fish, and at either end are handsome photographs of the fish market at Woolloomoolloo, a suburb of Sydney. On the east wall are choice paintings of salt-water fish by a prominent Australian artist, and at the portal is a trophy in the form of a lighthouse, composed of canned goods. Seals disporting on rocks in the centre of the court form an attractive group, and colonial flags and banners are among the decorative features of the display.

France occupies but a narrow space in the Fisheries department, between the British and Canadian sections. One half of the enclosure is occupied by exhibits of canned fish, mainly sardines and anchovies, with photographs illustrative of canning and other processes, among them the preparation of the olive oil in which the fish are preserved. The remainder of the space is largely devoted to the sardine fisheries, one of the exhibiting firms constructing pyramids of packed sardines; in the background a fishing scene is represented in graphic art. Nets, with a single model of a boat and a collection of gold medals, complete the private exhibits. From the government is an exposition of the national fisheries, with statistics, plans of hatcheries and grounds, and a chart showing the annual production of oysters.

Germany has a small and compact exhibit in the southwestern corner of the building, consisting largely of models of fishing craft, fully equipped and rigged, and of schooners and steamers used for conveying fish to market. One of the groups consists of fish guanos and chemicals, and another of fishermen's houses, fish markets, and their appurtenances. There are also pounds, traps, apparatus for transporting fish, and maps and diagrams showing the coast line of sea fisheries. A Munich firm has a large collection of hooks, lines, and spinners, and from Holstein come netting, baled rope, seines, corks, oars and prongs, buoys, and a model of the cutters used in the North sea. Another firm sends neatly bound volumes on the fishing industries of Germany, and there are large photographs of German scenery and of factories for the preparation of fish products.



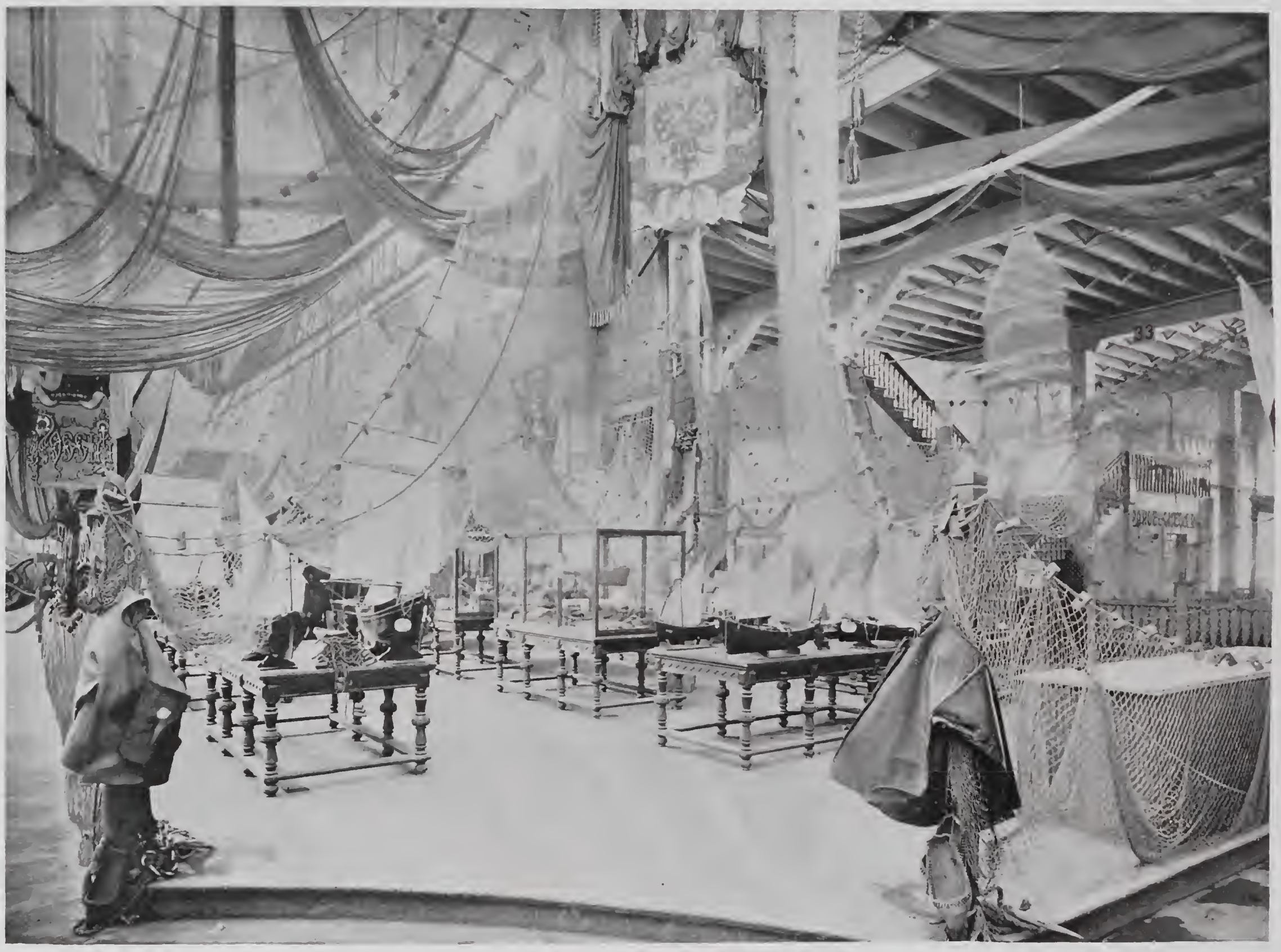
DRIED FISH, JAPANESE SECTION

In Russia, with her vast extent of coast and inland waters, the fisheries are of great economic value, far exceeding those of France and Germany, neither of which produce as largely as the dominion of Canada. In the White sea and on the northern coast of Norway several thousand tons, including more than 100,000,000 herring, are captured by Russian fishermen.

In the sea of Azoff and on the lower Don about 20,000 men are employed, with other thousands among the estuaries of rivers discharging into the Black sea. But the principal fisheries are on the Caspian and its tributaries, those of the Volga and its delta extending over an area of 6,000 square miles, while from the Ural fish are taken for 400 miles along its stream, the total catch exceeding 200,000 tons, worth at least 15,000,000 roubles. Within recent years a large station has been established at the Scenemorskoi fisheries on one of the mouths of the Volga delta, a region before uninhabited, and now supporting a flourishing settlement, with steamers, barges, lighters, and hundreds of fishing boats; with warehouses, stores, and barracks; schools, libraries, and hospitals, and all the adjuncts of a substantial and prosperous community. An average season's take is valued at 2,500,000 roubles, the catch consisting mainly of herring and dace, but including nearly a score of varieties.

In the Russian section, fronting on the rotunda and central nave, are specimens of fish, fishing craft, and apparatus from all the more prominent grounds throughout the wide domain of the tzar. From the Caspian come models of full rigged vessels, and from the Astrakhan board of trade, typical Russian fishing boats, including such as ply on the Volga, and convey the fish to market. There are the fishing garments worn in various localities, with appliances for sporting fishermen, and a collection of seal-skins and articles made therefrom by the monks of the Solovetzky monastery at Archangel. Then there are numerous devices for catching fish, as hooks, nets, and traps, with the machines for making them, and the tin fish used for decoys by inland fishermen.

In rear of the pavilion is a large column of canned goods from a St Petersburg firm, adjacent to which are cases of anchovies and an assortment of sturgeon in varied forms, with caviare, isinglass, and other industrial

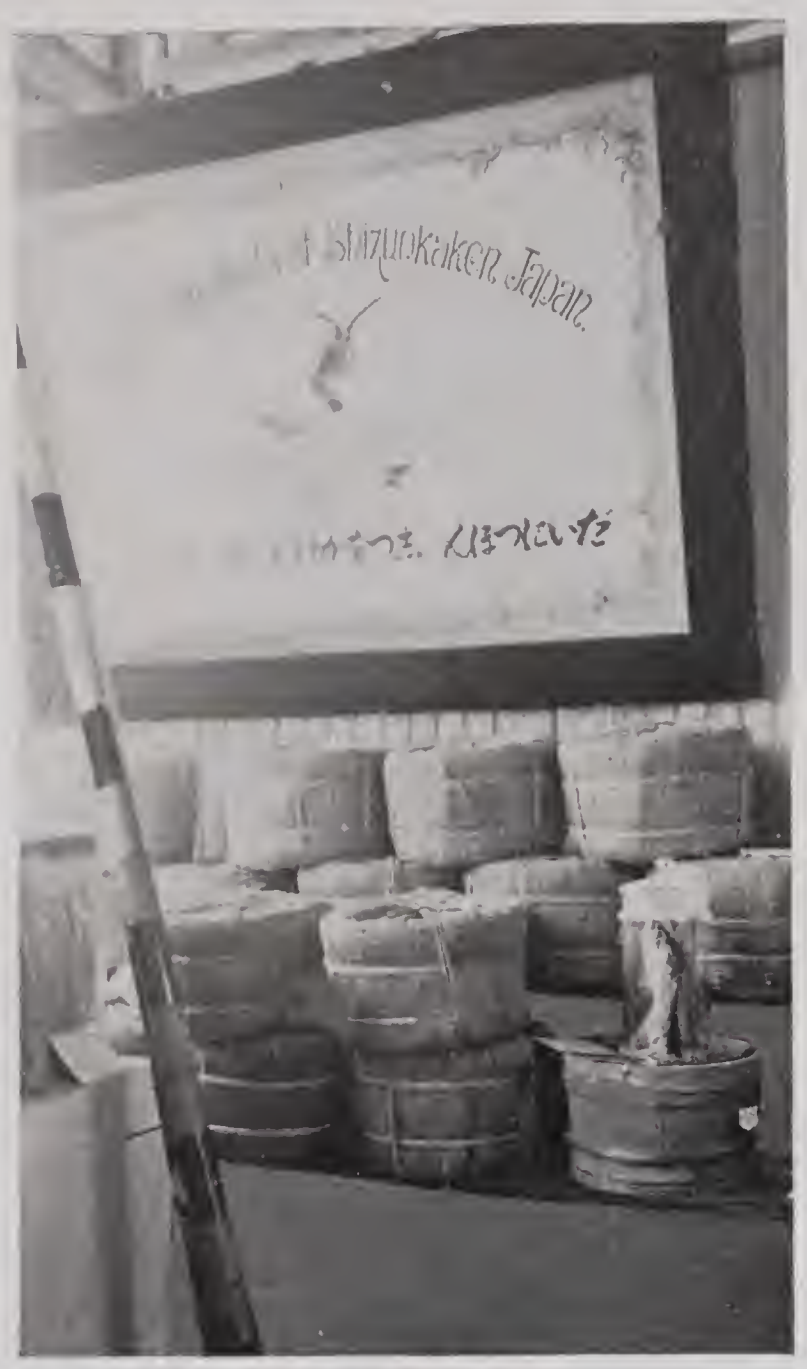


PORTION OF RUSSIAN SECTION

products. Of the specimens of fish-oils those from the Caspian sea rank first in commercial importance. Diagrams, charts, and maps are numerous, showing the location of the principal fishing grounds, and with statistical data as to the Ural Cossacks. A scene on the ocean shore, with hundreds of fishermen awaiting the signal to start, and a midwinter fishing scene on the Ural river are among the choicest photographs in this section, above which are suspended the Russian coat of arms and imperial crown, flags and netting forming the drapery of the pillars, while from the ceiling depends a large open trap-net serving as a canopy for the court.

The Netherlands, with their extensive fisheries, the herring catch of the North sea alone being valued at several million guilders a year, occupies but a narrow space in this department of the Fair. The feature of interest is a model of a herring schooner fully equipped, with the Dutch flag at the mast, the captain on the bridge, and the men in the act of hauling in the net, the vessel floating on a turbulent sea. Around it are samples of herring, gill and drift nets, hand-lines, signal-flags, and other fishing and nautical apparatus.

Greece completes the list of European participants, her section in the southwest corner of the gallery containing an elaborate collection of sponges from prominent Athenian firms. These are of every conceivable shape, some resembling articles of wear or household use, others in crude form, clinging to pieces of rock and



CORNER OF JAPAN SECTION

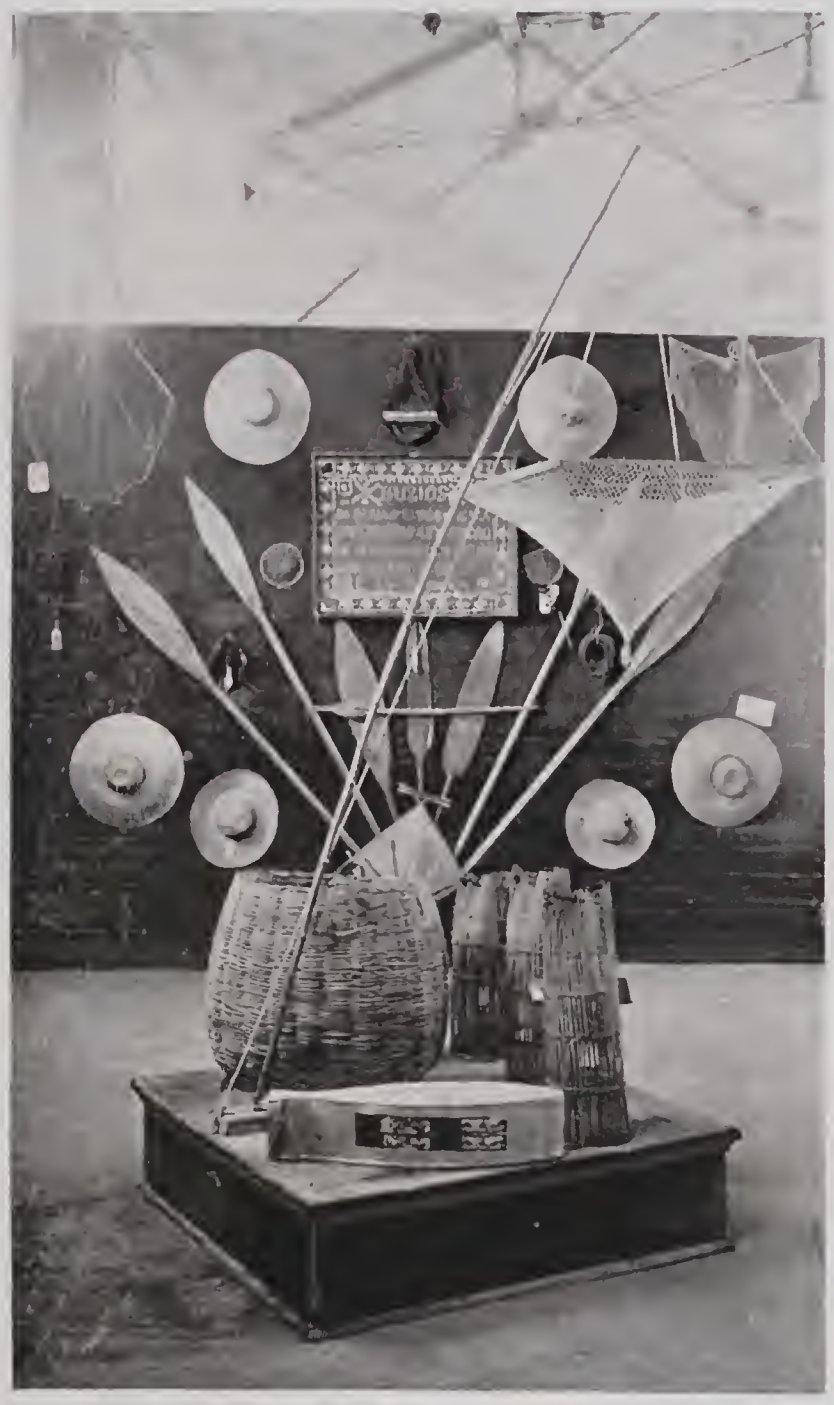
shell or partially covered with fungi. There are specimens thirty inches in diameter, and many of the same width, but almost as thin as the leaf of a water lily. In front of the enclosure is the national flag, and above the archway are displayed the coat of arms and crown of modern Greece.

Mexico has a tasteful exhibit adjoining the northern portal of the Fisheries building; and nowhere in the department are sea-shells and scale-work of more beautiful and varied hues. The specimens of fish, while the list is not large, are also of wondrous shades of coloring, and some of them of most fantastic form. Many are in a preserved state; but there are also assortments of dried, canned, and pickled fish, including the turbot and shrimp. In cases of steel and glass are sponges from Pacific and Atlantic waters, and pearls and fresh water shells, with articles of bric-a-brac made therefrom, in contrast with which are the bones and skin of the sea-cow. Around the enclosure are fish-traps, nets, oars, gigs, gaffs, spears, and fishing-rods. Yucatan's contribution consists of a sea-wolf weighing about 1,000 pounds, and in the rear of the pavilion is a sea-turtle more than five feet in length and as broad as long.



JAPANESE EXHIBIT

In a spacious enclosure fronting on the northeastern aisle Japan has arranged her exhibits with method and decorative effect. On the outer sides of the entrance-way where are Japanese masts, with cross-piece of oars and drapery of netting, are long tiers of shelving, containing specimens of fish in all the forms of preparation peculiar to the Japanese. There are numerous samples of canned goods, as salmon, smoked herring, oysters, halibut, tai, and a large variety of such delicacies as oyster sauce, sea-urchin paste, and sharks' fins prepared for soup. Fish scrap is shown in rope-bagging made of the stringy portions of dried lobsters. Guano from fish products, dried sea-ears, and soup extracts in bottles, boxes, and jars form another group, while blocks of wax from whale, sardine, and herring products are some of the materials of which Japanese candles are made. To illustrate their methods of sardine fishing and preparation for market, a number of pictures are interspersed among the exhibits. A collection of large photographs shows Japanese vessels in pursuit of the cormorant, and an oyster fishermen's village fashioned of bamboo, while the shark, cod, salmon, gold-fish, and many rare oriental species are also reproduced in graphic art.



BRAZILIAN NETS AND FISH-TRAPS

In one shape or another, nearly all the products of Japanese waters are here displayed. Mackerel, white-fish, sardines, plaice, bonita, cod, and dolphin are shown in forms prepared for table. In bottles there are well preserved specimens of fresh and salt-water fish, including the flying-fish, gold-fish, ox-tail, and red-scup. In alcohol are the Japanese star-gazer, black-perch, toad-fish, and carp, while shrimp soup in bottle, shrimps boiled in sea-water, abalone made into a relish for breakfast, smelts preserved in wine sediment, dried anchovies, and boneless herring, are a few of the

luxuries displayed in this section. The group of sea and spider crabs is worthy of mention, and the lobster without claws is somewhat of a novelty. Many articles of commerce are also on exposition, as paper made of sea-weed, scrap for fertilizing, and herring, sperm, whale, and other oils for various purposes.

In Japan all varieties of sea-weed are utilized, the yellow sea-weed being made into isinglass, of which the samples resemble the product of Irish moss. From other forms are shown specimens of jellies, salads, and gelatine, while from the more valuable grades is made a preparation highly prized for soups and extracts. Boneless cuttle-fish, of which there is a considerable export, are displayed with the bones at their side in the form of small shot, used by the Japanese for canary shooting. Oyster shells of remarkable size, pearl shells in profusion and of beautiful tint, and the largest collection of small sea-shells in the Fisheries building are arranged in attractive groups.



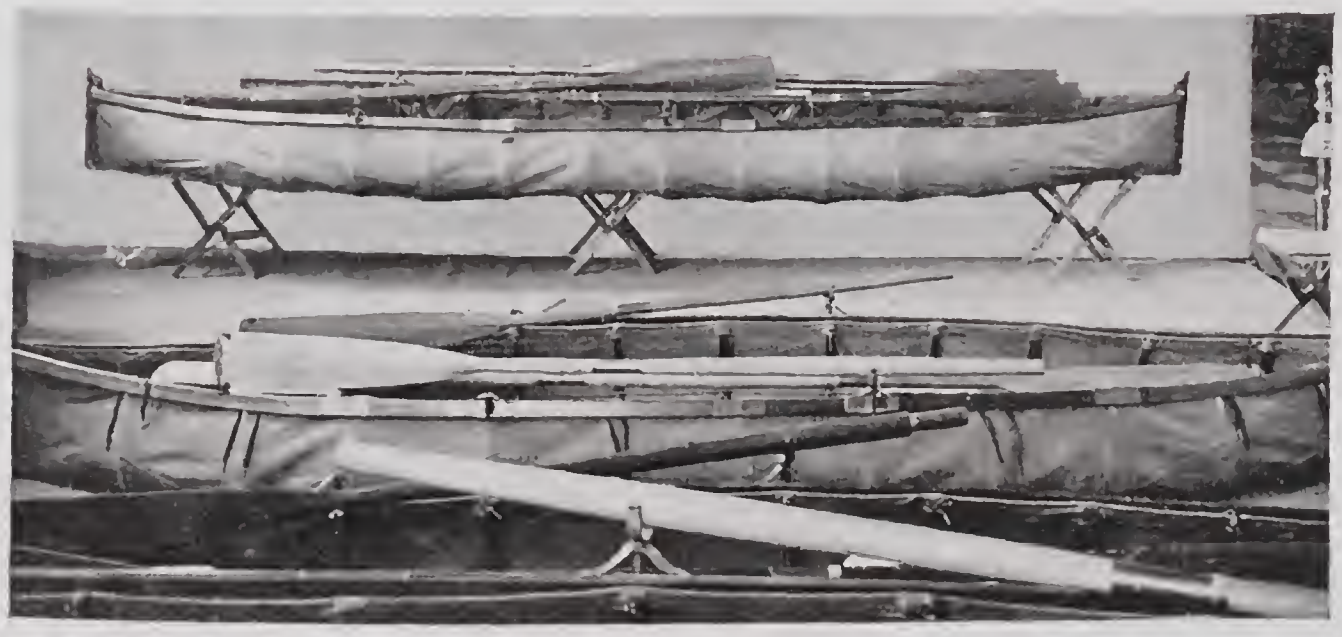
SHOWING WESTERN ANNEX FISHERIES BUILDING

The exhibit illustrating Japanese methods of capturing and preparing fish forms the central feature of the court. Here oddly-shaped fishing and angling boats are shown in miniature, with nets and outfit to match. Different varieties of nets, for herring, salmon, sardines, and tunny-fish are side by side with models of pound nets. Here also is a collection of curious fish-hooks, bait, flies, and trawls. Resting on a miniature ocean is a small fishing-boat, the crew of which are watching a number of decoy ducks fastened to their craft and floating on the water. A model of a furnace, with apparatus for curing fish, and an assortment of fish knives, represent Japanese modes of preparing fish for food purposes, while for extracting oils and converting the scrap into fertilizing substances, there are the old-fashioned hand-press and modern machinery, both in the form of models.



CROCODILE OF THE AMAZON

Entering the western annex from the main building, the first exhibit is that of the fish commission of Pennsylvania. In the centre of its pavilion is a miniature grotto, with a cascade descending into a pool below, and beneath the waterfall, a weir showing the method of catching mountain trout. In the pool are several fine specimens circling around the rocks and river plants, which give to it the appearance of a natural fish-pond. Surrounding the grotto are long rows of tanks, in which, swimming in their several aquaria, are most of the fish that frequent the waters of the state, including the sturgeon, pike, perch, trout, carp, cat-fish and gar-fish. Aquatic birds are freely displayed, and there are photographs and models of hatcheries and fish-ways, with modern piscicultural processes in actual operation.



MODERN FOLDING BOATS

Wisconsin occupies the adjacent section, and here are fully illustrated the excellent results attained by the state fish commission. In a series of tanks are displayed, among other specimens of native fish, the small-mouthed black-bass, sun and gold-fish, carp, rainbow-trout, cat-fish, bull-head, pike, and sturgeon. Statistics and other data are arranged in interesting form,



VIEW FROM LOGGIA FISHERIES BUILDING



BRAZILIAN JANGUADO

and aquatic plants artistically grouped add to the realistic appearance of the scene.

Across the aisle adjoining is the Brazilian exhibit, an interesting collection of the primitive fishing implements of native tribes, near which are the tackle and appliances to-day in use on the Amazon and other fishing streams. From Paria comes a peculiar type of fishing-boat, and from a botanical museum a collection of canoes made of bark and dug-outs hewn from a single log; but the most remarkable among the fishing craft is a specimen of such as ply on the waters of Pernambuco harbor and neighboring ports. In shape it resembles a raft made of logs, and is without compass or rudder, but will safely carry its crew far out to sea, or through waters where an ordinary boat would be swamped. Another unique exhibit is of the implements with which the ganoidal order of fish are caught by spearing them between their angular scales. In one of the cases is a collection of sponges, ornamental specimens, canned goods, fish-oils, and reptiles, some of the last of brilliant hues.

In the next section are paintings of American game-fish, algæ, and other forms of sea-life, with some choice paintings of the auk, an aquatic bird which has practically become extinct. One of the latter represents the bird's egg in life size, and in graphic art are reproduced scenes on and around Funk island, off the coast of Newfoundland, where was its breeding ground. Here it may be mentioned that, some years ago, Captain Collins, chief of the Fisheries department, gathered on this island more skeletons and bones of the auk than are possessed by all the museums in the world. An oil painting of the well-known fisherman Reuben Wood shows him with rod and reel in the act of casting a fly.

Near by a Chicago firm has a display of row and sail boats, with a seamless canoe made of a substance called linenoid, and an odd looking duck-boat almost as flat as a board, but warranted to "run wherever it is a little damp." A firm doing business in Racine, Wisconsin, shows a collection of fishing camp apparatus, and an Evanston exhibitor, a fac-simile of the tent ordered by Lieutenant Perry for his expedition to the North pole. A Clayton, New York, establishment occupies a considerable space with a St Lawrence skiff and a number of canoes, row-boats, and yawls, one of which cannot be capsized, and, though not more than twenty-five feet long and with four-foot beam, weighs, with its ballasting, over 500 pounds.



PAINTINGS IN THE ANGLING PAVILION

By an Ohio and a Michigan firm are exhibited folding boats for amateur fishermen. Though dissimilar as to pattern, the general make up of the vessels is the same, consisting merely of canvas, with an oil coating which renders them impervious to water, drawn over a frame-work, and so arranged that the frame can be taken out and the canvas wrapped around it, forming a handle which a man can easily carry, the entire equipment weighing only fifty pounds.



AMAZONIAN DUG-OUTS

Forest and Stream has one of the most attractive exhibits in the annex. It consists for the most part of photographs of hunting and fishing scenes, forming a collection of prize competitive work from all parts of the United States. The largest tarpon ever caught, weighing more than 200 pounds, is here on exposition, together with the apparatus by which it was captured; and by way of decoration are the heads of moose, buffalo, and mountain-goat, with gill-nets, rods, lines, and flags arranged in artistic forms. In a handsome case are files of the *Forest and Stream* from 1874 to 1893, with works on hunting and fishing, fish stories, and other interesting matter. Other features are the canoe of the patron saint of sportsmen, a model of the yacht *Gloriana*, and an assortment of Kentucky reels, none of them less than fifty years old, contributed by J. A. Henshall. A gun taken from a poacher at Yellowstone park by the editor of this periodical is one of the curiosities of the display. By the *American Angler* is also exhibited a fine collection of paintings of all the fish taken in American waters.

In the centre of the building are several private collections of rods, some with double enamel finish, of reels, tackle, hooks, landing-nets, and other articles pertaining to the craft. From Rochester comes an exhibit of automatic reels, while a Chicago firm displays its kosmic rods, some of them mounted in gold and silver. Another Chicago exhibitor has fishing-tackle with bell attachment, so that, when the fish bites, the alarm is given. By one of the participants are shown several machines in operation, manufacturing silk fishing-lines, 576 threads of raw silk being used for the making of a single line the thickness of an ordinary thread of worsted. In the angling section proper, an article never before on exposition is in the form of a flanged, flint-glass tube, in which is placed a live minnow for bait, and with a hole in the end to admit the water and to keep the fish alive.

The New England states make a fine display of the various appliances used in the fishing industry, including baits, lines, weirs, seines, and pound, purse, and gill-nets, the last showing how mackerel, herring, and cod are taken. Ohio has stuffed specimens in alcohol of all her principal fish, with aquatic birds peculiar to the state, and from the Cincinnati society of natural history are specimens of the smaller species, with all manner of aquatic insects. In the Missouri section is a complete display of indigenous specimens, including pickerel from the streams and lakes, striped-bass, German carp, small-mouthed bass from the Black river, paddle-fish, crappie, silver-bass, black-gilled sun-fish, sheeps-head, black-buffalo, sturgeon, tench, and cat-fish from the Missouri.

The Chicago fly-casting club, as a part of their exhibit, have reproduced on the shore of the north pond Izaak Walton's fishing cabin as still it stands on the banks of the Dove. From a manufacturing



DISTANT VIEW OF FISHERIES BUILDING

company of Chicago is a display of artificial flying-fish, with the process by which they are made, and among other articles, one of the finest collections of flies in the western annex.

World's Fair Miscellany.—In the decorative scheme of the Fisheries building there are some daring features, showing that the artificer has given rein to his fancy, and yet with pleasing effect. For the capital of one of the columns, for instance, a lobster-pot suggested a design in which is found nothing inappropriate. Over one of the door-ways is a group of sportive frogs, joined hand in hand in dance. Elsewhere the purposes of the building are freely suggested by its decorative themes. Around one pillar is a procession of sea-horses, and others are covered with star-fish, lizards and eels, lobsters, crabs, and turtles, with pisciform balustrades, the heads of fish resting against the railings, and their tails interlaced below.

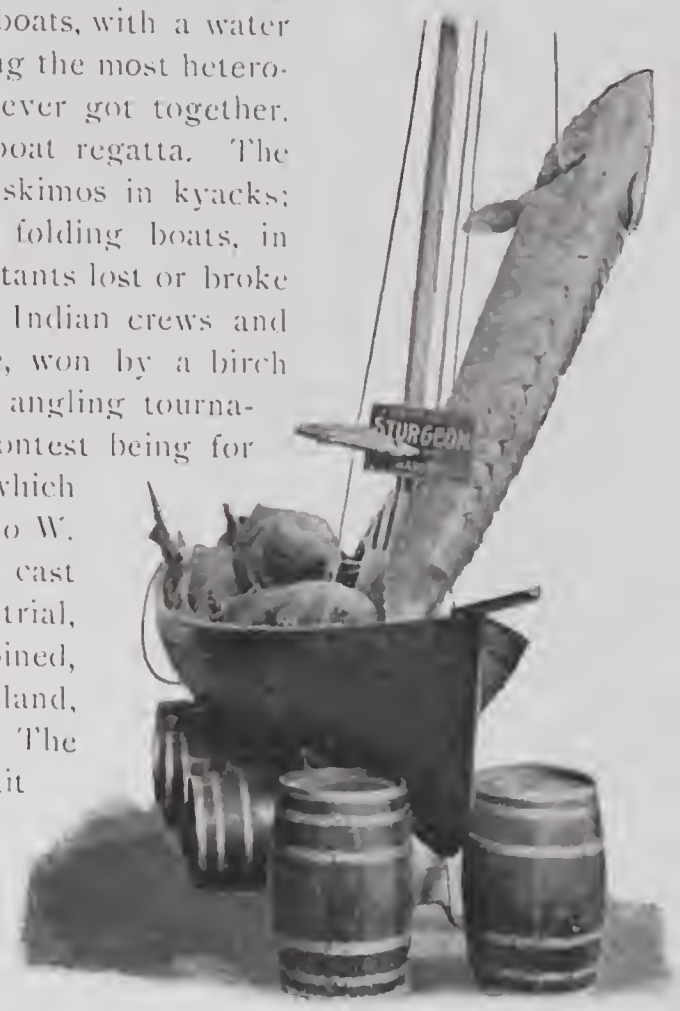


COD FISH FROM THE LOFODEN GROUNDS

Among individual exhibits not mentioned in the text are a couple of St Lawrence skiffs in the northwest corner of the gallery. These are from a Canadian boat firm, and are built of the finest wood, with nickel-plated rowlocks and bolts. Across the aisle from California's section is a private display of canned goods, as clams, clam bouillon, and sturgeon. In the north gallery a Wyoming inventor shows a device for conveying small fish alive to market, and near by is a private collection of birds, shells of all kinds and colors, corals, fossils, and marine curiosities.

The collection of Kentucky reels in the *Forest and Stream* exhibit is of special interest, as showing all the improvements made in this direction, for more than half a century, in the state where multiplying reels were first invented.

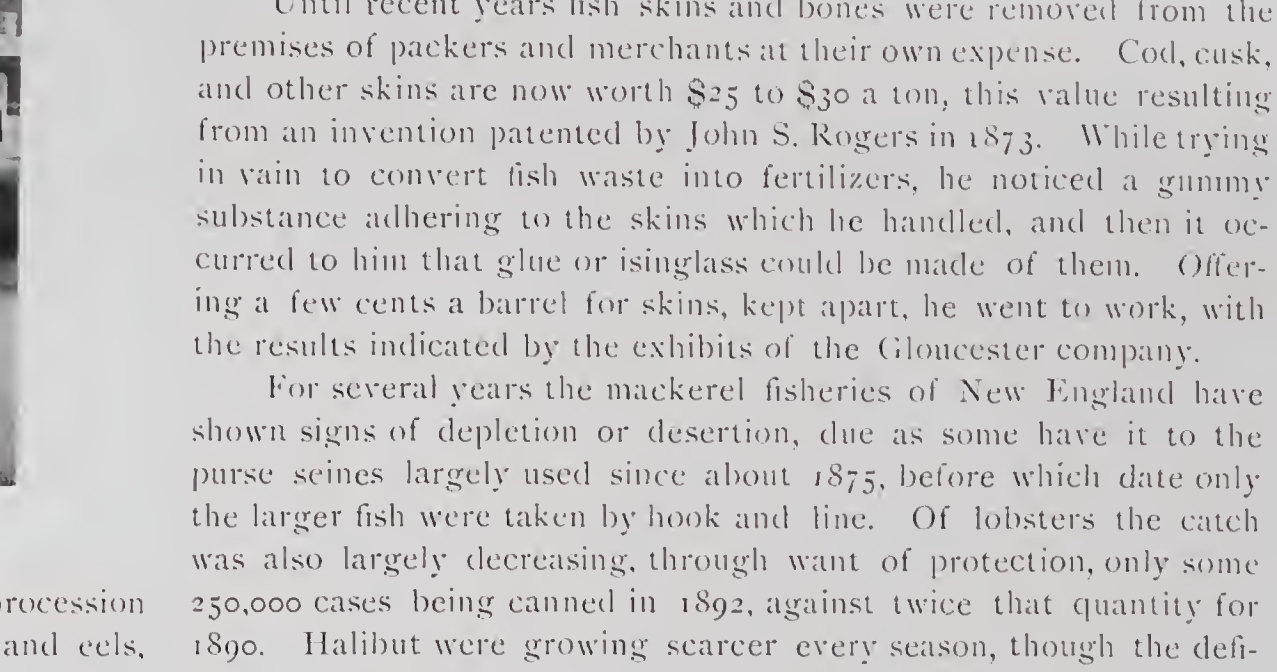
Between the 19th and 22d of September was held the fishermen's congress, with contests among fishermen for which prizes were awarded. After the session on the 19th the members dined together and then attended the procession of fishermen's boats on the lagoons. In front of this procession was a square-rigged whale-boat, followed by small craft representing all nationalities, including yawls from the Columbian caravels manned by United States marines and Spanish sailors. There were Eskimo kyacks, Ceylonese outriggers, Norwegian fishing-boats, lobster dories, racing shells, canoes, canvas folding boats, with a water bicycle and other craft, forming the most heterogeneous collection of vessels ever got together. On the 20th there was a fish-boat regatta. The first race was between two Eskimos in kyacks; the second between canvas folding boats, in which three of the four contestants lost or broke their oars; the third was for Indian crews and the fourth, a free-for-all race, won by a birch bark canoe. On the 21st an angling tournament was held, the opening contest being for long distance fly-casting, for which the first medal was awarded to W. H. Babcock, of Chicago, for a cast of 76½ feet. In the second trial, for distance and accuracy combined, H. G. Leavitt, of Grand Island, Nebraska, was the winner. The third test was for black-bass bait casting, and this also was won by a Chicago man, E. E. Wilkinson. On the following day the tournament was continued, this part of the programme being conducted under the auspices of the Chicago fly-casting club. On the 19th of October a banquet was held by the congress in the New York state building.



DISPLAYED BY WASHINGTON STATE

Until recent years fish skins and bones were removed from the premises of packers and merchants at their own expense. Cod, cusk, and other skins are now worth $25 to $30 a ton, this value resulting from an invention patented by John S. Rogers in 1873. While trying in vain to convert fish waste into fertilizers, he noticed a gummy substance adhering to the skins which he handled, and then it occurred to him that glue or isinglass could be made of them. Offering a few cents a barrel for skins, kept apart, he went to work, with the results indicated by the exhibits of the Gloucester company.

For several years the mackerel fisheries of New England have shown signs of depletion or desertion, due as some have it to the purse seines largely used since about 1875, before which date only the larger fish were taken by hook and line. Of lobsters the catch was also largely decreasing, through want of protection, only some 250,000 cases being canned in 1892, against twice that quantity for 1890. Halibut were growing scarcer every season, though the deficiency was partially made up from Icelandic fisheries, whence more than 700 tons were taken by American craft in 1891, notwithstanding legislative prohibition. Herring showed no signs of decrease, 24,200,000 of these fish being handled in Boston markets alone. Of haddock the largest take recorded was in February, 1891, when a schooner caught on the Cape Shore grounds 132,000 pounds, besides an equal quantity of other fish.



FISHING BOATS OF TO-DAY

An acre of good fishing-ground, it has been said, will produce

more food than an acre of the best farming land. This is as true to-day as it was two or three centuries ago; for except in a few varieties there has been no very serious diminution in the supply of fish in United States waters, and all the species found in pilgrim times exist in abundance to-day. Meanwhile our fish trade has grown to enormous proportions, that of Boston, for instance, where the first fish store was opened in 1807, and the first fresh fish store in 1835, averaging more than $15,000,000 a year.



OUT-DOOR EXHIBIT

During the cod-fishing season at the Lofoden islands, in the months of February and March, the average catch is about 30,000,000 of fish, and of such importance is this industry that the number taken each day is telegraphed to all the principal cities in the kingdom. On a picturesque harbor in the heart of these islands is the town of Stamsund, where are the cod-liver oil works of Peter Möller, described in Paul B. du Chaillu's *Land of the Midnight Sun*. By Möller was originated the steam process of preparing this oil from fresh, clean, healthy livers, and without nauseating smell or taste. When the midnight sun appears in all his radiant splendor, illuminating some of the most romantic of Norwegian scenery, the islands are visited by thousands of tourists. Here snow-clad peaks rise in almost perpendicular lines for thousands of feet above the ocean. For most of the year the ravines are filled with snow, and thence numberless streams descend in foaming cascades to the fjords below.

The edible sea-weed mentioned in the Japanese exhibit is dissolved, when boiled, into a glue-like liquid, but of palatable flavor. When used for soup it is cut into shreds which resemble curls of light, fluffy hair. For one purpose or another the Japanese use almost every form of sea product. The octopus and squid are eaten, and the toad-fish is prized for its medicinal properties, the soup made therefrom being freely used by invalids. All these are on exposition in this section.





CHAPTER THE EIGHTEENTH

TRANSPORTATION



WHILE here and there exception may be taken to the arrangement and combination of exhibits, as the grouping of musical instruments in the department of Electricity, and of mail-bags and Leghorn hats in that of Liberal Arts, it is generally conceded that the entire Exposition and each of its divisions and subdivisions have been planned with consummate skill. And nowhere is this more apparent than in the Transportation building. Here, as elsewhere, but here especially are features that claim the attention of every class of visitors; and as the chief of this department states, "Among its main purposes was to fascinate and attract by the presentation of the most striking contrasts; to educate by showing the wonderful achievements of engineering science, and the great results developed from apparently simple discoveries and inventions."

Whether for study or for the mere gratification of curiosity, the exhibits grouped in this department are of surpassing interest; for here is presented in most attractive form a complete history of all the known methods and appliances for travel and transportation, barbarous, semi-barbarous, and civilized, from the pack-animal to the vestibuled train, and from the dug-out of the savage to the swiftest of trans-atlantic steamers. In no branch of human endeavor, except in the application of electric power, has such progress been made as here is shown, and nowhere than in this country of magnificent distances has the annihilation of distance been more nearly approached. Yet achievement thus far is but a foretaste of that which is to come; there are those now living who may journey by rail from Paris, possibly without change of cars, to a great world's fair to be held, let us say, in New York, toward the middle of the coming century.[1]



[1] The connection of the railroad systems of the world by way of Bering strait is by no means the chimerical project that some would have us believe, nor one that may not ere long be accomplished.



LOOKING TOWARD THE GOLDEN DOOR

"Of all inventions," remarks Macaulay, "the alphabet and the printing-press alone excepted, those inventions which abridge distance have done most for the civilization of our species." Such appliances are in truth the prime factors of commercial and industrial growth, and never before was such an opportunity for observing their development in all their manifold stages.

In structural design the Transportation building, with its spacious annex, is one of the simplest and most unassuming of all the Exposition edifices, and yet with a richness of decorative forms that relieves it from poverty of design. But in covering the allotted space of fifteen and a half acres, its architects, the Chicago firm of Adler and Sullivan, had first to consider the character of the display whose housing was to be intrusted to their care, largely consisting of rolling stock and other cumbersome exhibits. Thus it was that architectural symmetry and proportion were made in a measure to give place to considerations of practical utility, that except for the Fisheries building, its width, in relation to length, is smaller than in any of the principal structures, and that its exterior aspect differs essentially from all the rest.



STATUARY TRANSPORTATION BUILDING



FIGURES BY BOYLE

The Transportation building proper was erected on the southwestern bank of the lagoon which surrounds the wooded island forming a portion of the Horticultural grounds. Opening into it and covering a larger area is the annex, extending westward almost to the limits of the park, and in which are the principal railroad exhibits of the United States, Great Britain, and Canada. In the main façade, separated by the lagoon from the hall of Manufactures

The bridging of that shallow strait by way of the Diomede islands, almost in the middle of its narrowest part, presents no such engineering difficulties as were encountered by the artificers of the Central and Canadian Pacific railways. With the latter system the line would connect by way of Alaska, for the most part across a level plain, and on the Siberian side would skirt the base of the Stanavoi mountains, avoiding the tundras or marshes between them and the sea. To Vladivostok, on the sea of Japan, Russia's principal naval station on the Pacific, a railroad is already nearing completion, and such a route, if operated only for a few months in the year, would open for settlement or industrial purposes a vast extent of unoccupied territory, much of it rich in resources.



COWBOY IN FRONT OF BUILDING. PROCTOR

Of all the Exposition buildings this is the only one whose exterior has been treated with color decorations. Beginning at the base with a light, delicate red, the polychrome treatment culminates in the golden doorway and the spandrels of the arches, in the centre of which are winged female figures, typical of transportation methods. This portion of the design is executed with singular delicacy of technique, the hues interblending in thirty different shades, and yet with such harmony that the entire effect is that of a single painting. On the northern side is a line of statuary representing great inventors; on the south, on either side of the doorway, are statues of Stevenson, Watt, Vanderbilt, and others, with figures emblematic of land and water transportation, and on the east are other symbolical groups.

The interior resembles somewhat an ancient basilica, the general plan partaking of the Romanesque, though with features suggestive of the French school as represented in the Ecole des Beaux Arts. But whatever their motif, the artificers of the Transportation hall, by whom were also designed the Auditorium and other prominent buildings recently erected in Chicago, have here adopted a style of treatment at once simple, chaste, and refined.



A SECTION OF FRIEZE

and Liberal Arts, is the point of architectural emphasis, "the golden doorway," enclosed by a fretted arch or series of arches resplendent with gilding, and with a chaste embroidery of bas-reliefs and arabesques. Around this portal are symbolic groups representing ancient modes of transportation as contrasted with the luxuries of modern travel. On either side are balconies and terraces, the latter with small kiosks, somewhat in the Mogul style of architecture. The expanse of frontage is further relieved by smaller doorways on either side of the more spacious entrance, and by allegorical figures representing the purposes of the building. At the ends are still other doorways, with several openings from the rear façade, the former with projecting pavilions richly decorated and flanked as in front by terraces. The roof, which is in three sections, the central one rising above the others, and with walls so pierced as to form an arcaded clear story, is surmounted by a cupola 160 feet in height, and surrounded by balconies to which, as also to the galleries, visitors are conveyed by swift-running elevators from the ground floor. From the higher balconies is viewed to the best advantage the city of the Fair.



GROUP BY BOYLE

At right angles to the main interior façades are lines of rails, separated by passage-ways, and so spaced that two pairs give to each of the bays a width of thirty-two feet. This, says one of the Exposition architects, "became the module of dimension and the common divisor of the plan, forming the basis of the whole architectural scheme." In the annex, a plain one story building, are also railroad tracks, perpendicular to the

transfer table, by the use of which the heaviest of rolling stock was readily placed in position. Along the central nave and elsewhere are long lines of locomotives, burnished to an almost painful degree of brightness. Add to this an endless array of other massive exhibits, to which an imposing vista of colonnades imparts a further emphasis, and we have in the hall of Transportation a spectacle which the visitor does not readily forget.

It was one of the purposes of this department to furnish, in a series of object lessons and with a wealth of detail such as was never before presented in written or illustrative form, a history of that science in all its details, such as carries the mind back from the year of 1893 to cycles long antedating the reign of the Pharaohs. Here, in its three main divisions of railways, vehicles, and vessels, are all known appliances for the conveyance of man, and that which man and nature have produced, with specimens or models of the machinery, and of all else whereby have been evolved the ancient and modern systems of locomotion and transportation. In the railroad groups are included mountain, spiral, and ship railways, with locomotives of every kind, from



SHOWING SECTIONS OF UNITED STATES VEHICLE AND BRITISH MARINE DIVISIONS

the one driven by George Stephenson to the hugest of steam leviathans. There are freight and passenger cars; drawing-room, parlor, and dining cars; officers' and private cars; mail, baggage, and express cars; working and construction cars; and if there be any other than these, then are they here on exposition. Here also are illustrated railroad construction, maintenance, equipment, operation, and management, with the history of railroads, exemplified by a collection of rolling-stock and relics, some of them more than half a century old. In the vehicles group are such as are or have been used on common roads, from an ancient war-chariot to a tally-ho coach, from a Chinese wheel-barrow to a brougham and victoria, and from the lumbering Indian bullock-cart to the sleigh and the swift-running bicycle. In the marine division are represented vessels of every form and size, from an African pirogue to an ocean-going steamer, with models of war-ships and war-boats selected from all the nations of the world.

Says the chief of the department, Willard A. Smith: "It is but moderate and fair to state that the railway division has never been approached in extent, variety, and general interest; that the vehicle division is a surprise even to the best informed, and that no previous marine exhibit of the many which have been held



VIEW FROM CENTRE GALLERY LOOKING NORTH

more than seventy-five carriages made by the most famous European builders. When this department was organized, no American, not immediately concerned in the work, believed it could be made other than purely American, and not a single country asked for space. Extremely discouraging was the reluctance with which two great foreign powers granted the privilege of reserving—not assigning—for each 15,000 square feet. Briefly, it may be said that the plans adopted have so won their way that more than one third of the entire space was awarded to foreign countries, with applications for additional areas, some of which we were compelled to refuse."

The railroad exhibits are the most prominent feature in the department of Transportation, including locomotives, cars, railroad trains, and railroad materials and supplies, contributed by many companies and by all the nations whose systems of intercommunication are most fully developed. Here is represented a branch of industry wherein is invested a capital of $28,000,000,000, of which more than one third was supplied by the United States. There is not enough money in the world, including its entire metallic and paper currency, to purchase one half of its railways, and the aggregate banking capital of all the nations forms but an insignificant amount as compared with that which has been sunk in railway enterprise. To civilized communities the railway is almost as necessary as is the circulation of blood to the individual, not only furnishing the means of locomotion, but bringing to our doors nearly everything we eat or drink or wear. Few there were who foresaw the marvellous events accomplished by railroad development, from the time when Stephenson drove his first locomotive at the rate of a dozen miles an hour, with a signal man riding in advance, until to-day, 60,000 locomotives speed at thrice that rate over 350,000 miles of track. And even in these closing years of the century, railroad enterprise is almost in its infancy, its benefits extending to less than one half of the habitable globe. In the entire continent of Africa there are less than 4,000 miles of road; in eastern and northern Asia there are less than 3,000, while South America and Australia have but a few thousand miles. Yet each of these regions could support a larger population than that of the United States, where a few of the leading corporations control a larger roadway and a heavier volume of traffic than all these countries combined.

In passing in review the railway exhibits of the United States, I will begin with that of our pioneer enterprise, the Baltimore and Ohio company, in whose elaborate display, almost in the centre of the annex, is a collection of the railways of the world, from those of most primitive pattern to the Royal compares with this one in variety of detail and number of striking features. Two years ago it would certainly have been deemed improbable and even impossible, that we should secure from Europe a number of locomotives and cars, besides a large amount of railroad material and machinery, in view of the fact that there is no market in this country for such things. Almost equally improbable was considered the assembling here in an inland city of models of the world's navies, and of



STOURBRIDGE LION, BALTIMORE AND OHIO HISTORICAL EXHIBIT



MODEL OF HUDSON VALLEY COAL ENGINE



TRANSPORTATION BUILDING FROM THE WOODED ISLAND

Blue Line express now running between New York and Washington. First, however, it may be of interest to sketch briefly the history and condition of our railroad systems, with their 175,000 miles of track, or more than one half the total mileage of the world.

In 1827 was laid the first rough track between Quincy and Boston, for hauling granite by horse-power for the Bunker hill monument. A year or two later a locomotive resembling that which Stephenson built was shipped from England for experimental purposes. It weighed about five tons, and drew on a level road-bed near the town of Honesdale, Pennsylvania, a load of some 30 tons, at a maximum rate of 25 miles an hour, this being considered at the time a marvel of speed and power. Early in 1830 was opened the first section of



EXHIBITED BY THE BOSTON AND PROVIDENCE COMPANY

the Baltimore and Ohio railroad, with wooden rails fastened by bars of iron. It was not until the following year that sufficient cars were built for regular passenger travel, and in July of that year was published in a Baltimore journal the first railway time table issued in the United States. It read in part as follows: "A brigade of cars will leave the depot on Pratt St at 6 and 10 o'clock A.M., and at 3 and 4 o'clock P.M., and will leave the depot at Ellicott's Mills at 6 and 8½ A.M., and at 12½ and 6 P.M." Thus did the burghers of Baltimore journey in their brigades of cars, still drawn by horse-power; for not until 1833 were steam-engines placed on the road. Meanwhile, in October 1831, the first passenger train drawn by a locomotive ran between Albany and Schenectady on the Mohawk and Hudson line. The engine used was the *John Bull*, of historic fame, now occupying a place of honor among the exhibits of the Pennsylvania Railroad company.



PROCTOR'S INDIAN AND HORSE

As to the discomforts attending these primitive modes of travel, the following extract from *Gilpin's Cosmopolitan Railway* may serve as a description: "The cars were of the rudest construction, resembling at first the old-fashioned English stage-coach, and with none of the modern appliances. The seats were narrow, stiff-backed and uncushioned, and the roof of the car so low that in winter ventilation was impossible. At each end a stove warmed the poisonous atmosphere, and at night a single tallow candle gave forth a dim and flickering light. The springs were of the most primitive pattern, causing the vehicle to jolt and the sashes to rattle like those of a modern hotel coach, so that reading and conversation



GROUP ON BUILDING. BY BOYLE

were not to be thought of. The dust was intolerable, and as there were neither spark arresters on the engine nor screens at the windows, the traveller emerged from his car smutted and begrimed as though he had passed the hours in a blacksmith's shop."

From a score of miles in 1830 the length of track in operation increased to nearly 30,000 miles in 1860. During the time of the civil war less than 3,000 miles were constructed; but in the seven years ending with 1872, the total mileage was almost doubled, and thenceforth rapidly increased until, as I have said, in 1892 there were 175,000 miles of road-bed. Of this about one third lies west of the Mississippi river, a region where in 1850 there was not a single mile of track. In the United States there is on an average a mile of railroad to every 500 inhabitants, while in Europe the average is a mile to every 2,000 inhabitants, the volume of traffic in proportion to population far exceeding that of European countries. The operations of the larger companies are on a colossal scale, some of them handling 40,000 or 50,000 tons of freight a day, and with a corresponding amount of passenger travel. The total of freightage is probably not less than 600,000,000 tons a year, and of passenger fares about 500,000,000, from which the gross earnings may be estimated at $1,100,000,000, and the net earnings at nearly one third of that amount.

In the exhibit of the Baltimore and Ohio company, occupying nearly an acre of floor space, is an almost complete illustration of railroad development, both as to engines and cars, the former arranged as models or originals of locomotives that have become historic. The collection begins with a fac-simile of Sir Isaac Newton's steam carriage, fashioned in 1680 on principles suggested by Hero's æropilon, or steam ball, which latter invention bears date 130 B.C. Newton's apparatus consisted of a copper boiler mounted on a frame which rests on wheels, a pipe with plug valve pointing backward from the boiler, and with the operator seated in front, the reactionary force of the steam, generated by atmospheric resistance, being expected to furnish the motive power. Whether Sir Isaac's carriage could ever be induced to move, history recordeth not, and it can only be said that, if the one exhibited at the Fair is a faithful reproduction, it does not look as if it could.

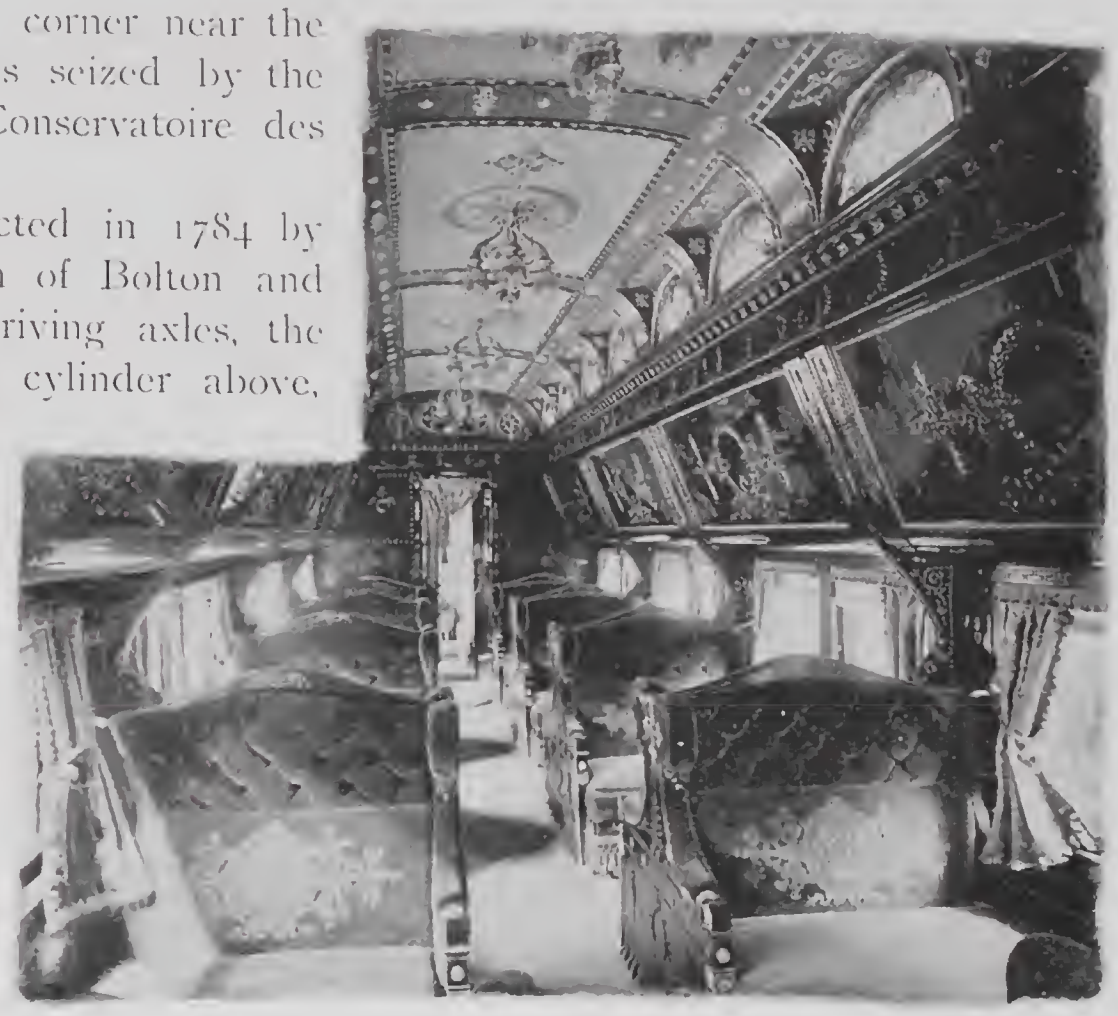
Next is a model of a steam carriage, in which is partially reproduced Denis Papin's invention of 1690. The former was the contrivance of a French army officer, and was intended for military service. It was one of the most cumbersome contrivances that man could devise, its heavy frame mounted on three wheels, the huge kettle-shaped boiler suspended over the single forward wheel, with single-acting cylinders, steering, and other apparatus, the operator seated on a platform, guiding the machine by a double-ended lever connected by gearing with the frame-work of the driving wheel. Greatly to the annoyance of mankind and the terror of horse kind this unwieldy engine made its appearance in the streets of Paris about the year 1769, and was there re-



STATION FOR ELECTRIC LAUNCHES

garded as a public nuisance, until one day turning a corner near the Madeleine it came to the ground with a crash, was seized by the authorities, and is now one of the curiosities in the Conservatoire des Arts et Metiers.

Even more ponderous was the engine constructed in 1784 by William Murdock, an engineer employed by the firm of Bolton and Watt. Its boiler rested on a frame in rear of the driving axles, the flue passing through it, the fire box beneath, and the cylinder above, the valve being worked by the walking beam. Of this there is a reproduction on a larger scale in the Baltimore and Ohio collection; but for what purpose it was built, except to demonstrate the possibility of running carriages by steam, does not appear. Certain it is that it could not be intended for practical use.



PALACE SLEEPING CAR

Three of the Trevithick engines are reproduced, one of them being actually used about the year 1808 as a locomotive; and with it are sections of rails, short, rusty pieces of iron, and the stone ties which preceded those of wood. Then comes the steam dredge which Oliver Evans constructed a few years earlier near Philadelphia. Passing by other models, among them a Blenkinsop engine provided with a cog wheel, the famous *Puffing Billy*, and the first one patented in the United States, we come to Stephenson's *Rocket*, which has been a thousand times described. Not far away is the *Stourbridge Lion*, built in 1829, and the first used in the United States for locomotive purposes. This is of the grasshopper type, of which there are many specimens in the collection, all somewhat resembling a primitive fire-engine mounted on a flat car. In models or originals are many engines which have done good service in their time, among them the *Traveller*, the first freight engine of the Baltimore and Ohio road; the *Mazeppa*, the first with horizontal cylinders; the *Hercules*, the first with equalizing beams; the *Peppersauce*, the first to climb Mount Washington; and a Perkins engine built in 1863, and removed from active service to take its place in Transportation hall. All the improvements made within the last three score of years are included in this exhibit, which ends with a Royal Blue express train, at the head of which is one of the most powerful of compound engines, manufactured at the Baldwin Locomotive works. Here are shown progressively and in detail the various stages of development, how the first horizontal boiler replaced the vertical boiler, and the engine whose steam passed upward through the smoke-stack superseded the clumsy device in which a blower was used to aid combustion. There is also a collection of rails, from such as were laid without flanges more than half a century ago to the modern rail of Bessemer steel. Finally is shown in photographic form the railway machinery used in every quarter of the world.



SPECIMEN OF PARLOR CAR

Adjoining the section occupied by the Baltimore and Ohio railroad is the main exhibit of the Pullman Palace Car company, in which the most attractive features are two complete exhibition trains, a limited and a day train. Both are of finished workmanship, representing in its highest form of development a purely American invention, one opening a new field of progress in which no tentative efforts had been made in other lands. And yet it may be said

that, like other valuable inventions, this was almost the result of an accident. Some thirty-five years ago, while travelling by night from Buffalo to Westfield, George M. Pullman lay awake, bethinking him how to convert the rude sleeping car then in use, into a comfortable dormitory on wheels. The idea grew upon him, and in due time he rented a workshop at Chicago, hired skilled mechanics, and applied himself in earnest to the task. The result was the car *Pioneer*, the first one built, and costing $18,000, or more than four times as much as the best before constructed. Though at first encountering strong opposition, it gradually revolutionized existing theories of construction, for nowhere else could be found such a combination of strength and beauty, with minute elaboration of devices for ease and comfort. From this small beginning was developed the Pullman enterprise, with property valued in 1893 at $60,000,000, and with more than 2,500 sleeping, parlor, and dining cars, carrying 5,000,000 or 6,000,000 passengers a year over the 125,000 miles of railroad under contract with the company.



OBSERVATION CAR



SLEEPING ACCOMMODATIONS

In all the Transportation department there is no more handsome exhibit than the Pullman Columbian exhibition trains almost in the centre of the annex. At the head of the limited train is one of the most powerful of compound engines, named *Columbus*, from the Baldwin Locomotive works at Philadelphia. First is the baggage and smoking car *Marchena*, with bath-room, barber's shop, writing-desk and library. Next is the dining-car *La Rabida*, finished in the finest of vermilion wood imported from Central America, with windows of stained glass in delicate hues, seats elaborately carved, and kitchen which is a model of cleanliness and condensation of space. There are the sleeping car *America* and the compartment sleeping car *Ferdinand*, both marvels of comfort and decorative skill, the latter finished in Pompeiian red, and



FOR THE POSTAL SERVICE

satin wood, artistically carved and polished to a mirror-like brightness, each of its compartments a miniature boudoir, and with separate design and color scheme, as in ivory and gold, in olive green, in blue and satin wood, all with upholstery of silk brocade. The last is an observation car, named *Isabella*, a portion of which is furnished as a drawing-room, with large railed platform at its end. In this train it would almost seem that the perfection of comfort and convenience had been attained, many skilful devices, though small in themselves, contributing to the general effect. All the compartments are provided with toilet appliances, and with water, hot, cold, and iced. The electric lights are shaded with silken fringe; the entrance ways paved with mosaic, and vases placed on stands remain undisturbed by the motion of the train; so smoothly run these palace cars, the very embodiment of the luxury of modern travel.

In the second train is a mail car of novel pattern, its walls finished with white enamel, with mail boxes of cherry, and all the appliances of railroad postal service. Next is the passenger coach *1893*, with the softest



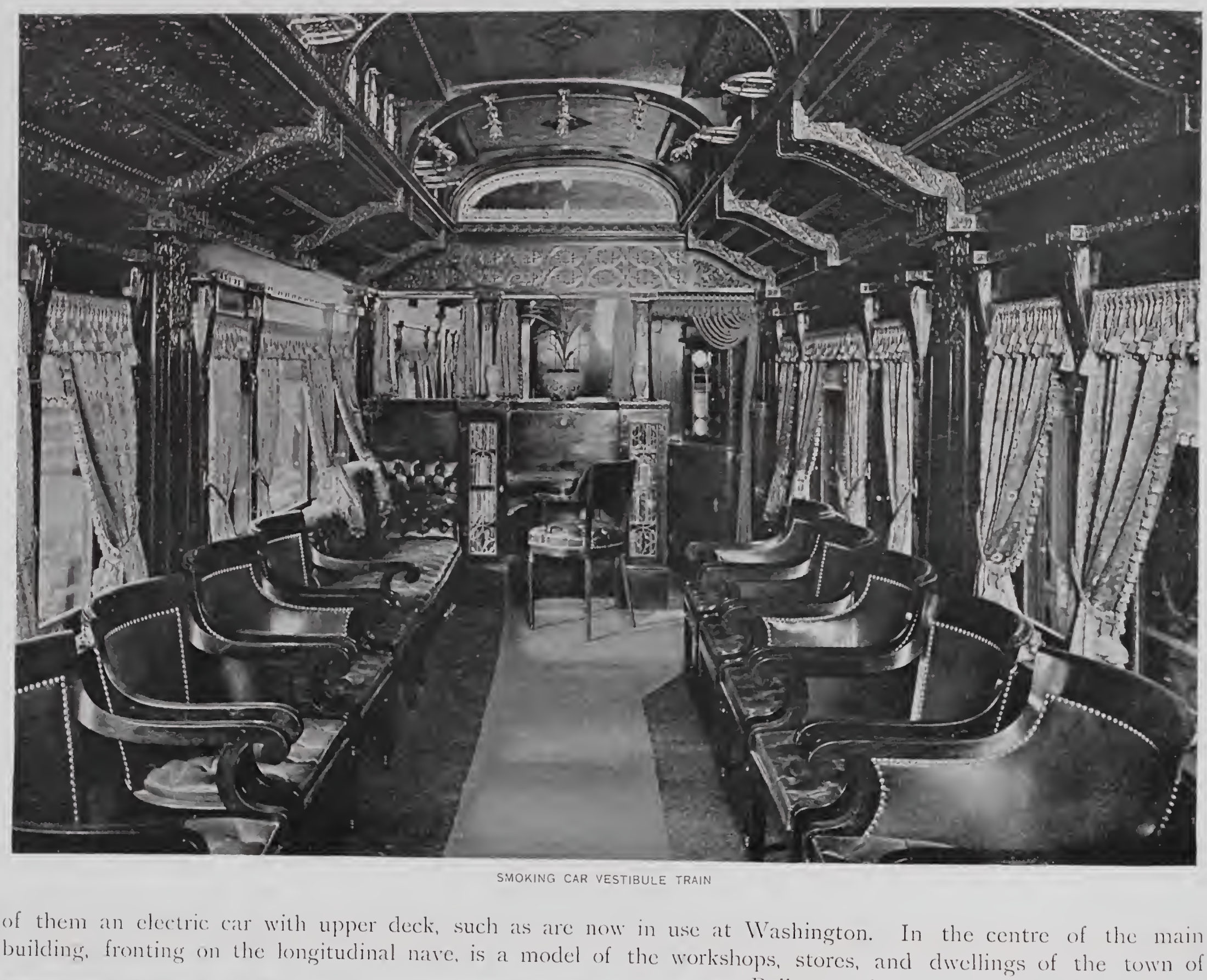
DINING-CAR, VESTIBULE TRAIN

of high-backed cushioned seats, the parlor car *Maria*, with its sumptuous appointments completing the railroad exhibit. All the cars are equipped with the Pullman vestibule, forming a solid yet sinuous train, under a single roof, and allowing the traveller to pass in comfort as in his own home, from sitting to dining or sleeping room. Here for the first time is shown the application of the vestibule system to the entire width of the cars, by extending the sides and enclosing the ends, with an original and ingenious arrangement of entrance doors, and with trap doors above the steps, whereby is avoided the exposure to wind and weather on ordinary cars with open platforms and projecting hoods. A still more important advantage is that it affords practical immunity from danger to passengers even in case of violent collision.

An entirely new and conspicuous feature of these two trains, and one which attracted wide and favorable comment during the Exposition, is the application of the vestibule to locomotive tenders, making it impossible for either the tender or the car next to it to be elevated to a position where one would telescope

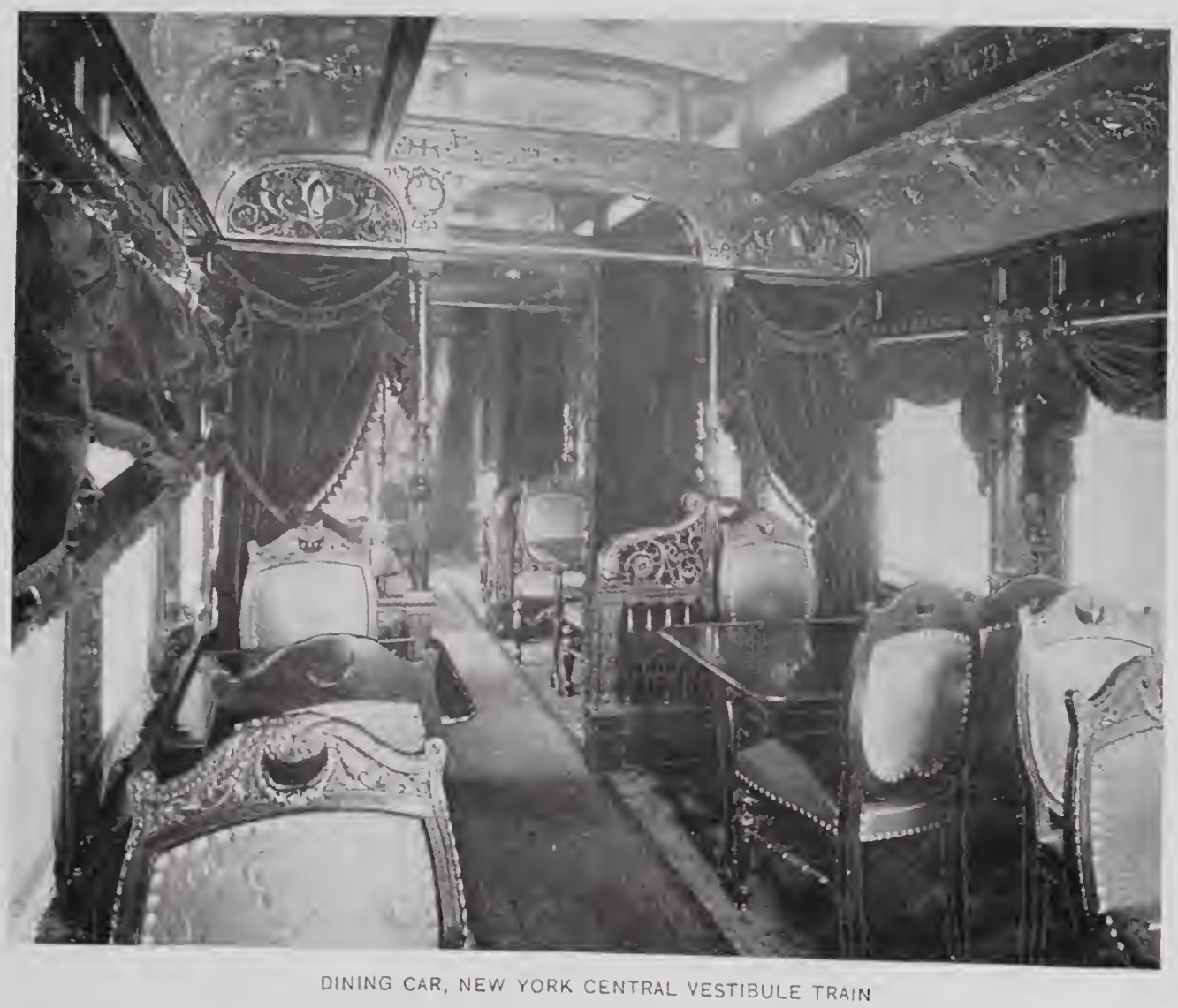
into the other. By its use the locomotive is made a factor of safety in resisting shocks due to collision; and the train is made solidly continuous, practically ensuring the mail clerks, baggage and express men, and engine men, as well as the passengers, from injury in case of collision.

In the Pullman group is also a set of standard six-wheel trucks, with street cars of various patterns, one



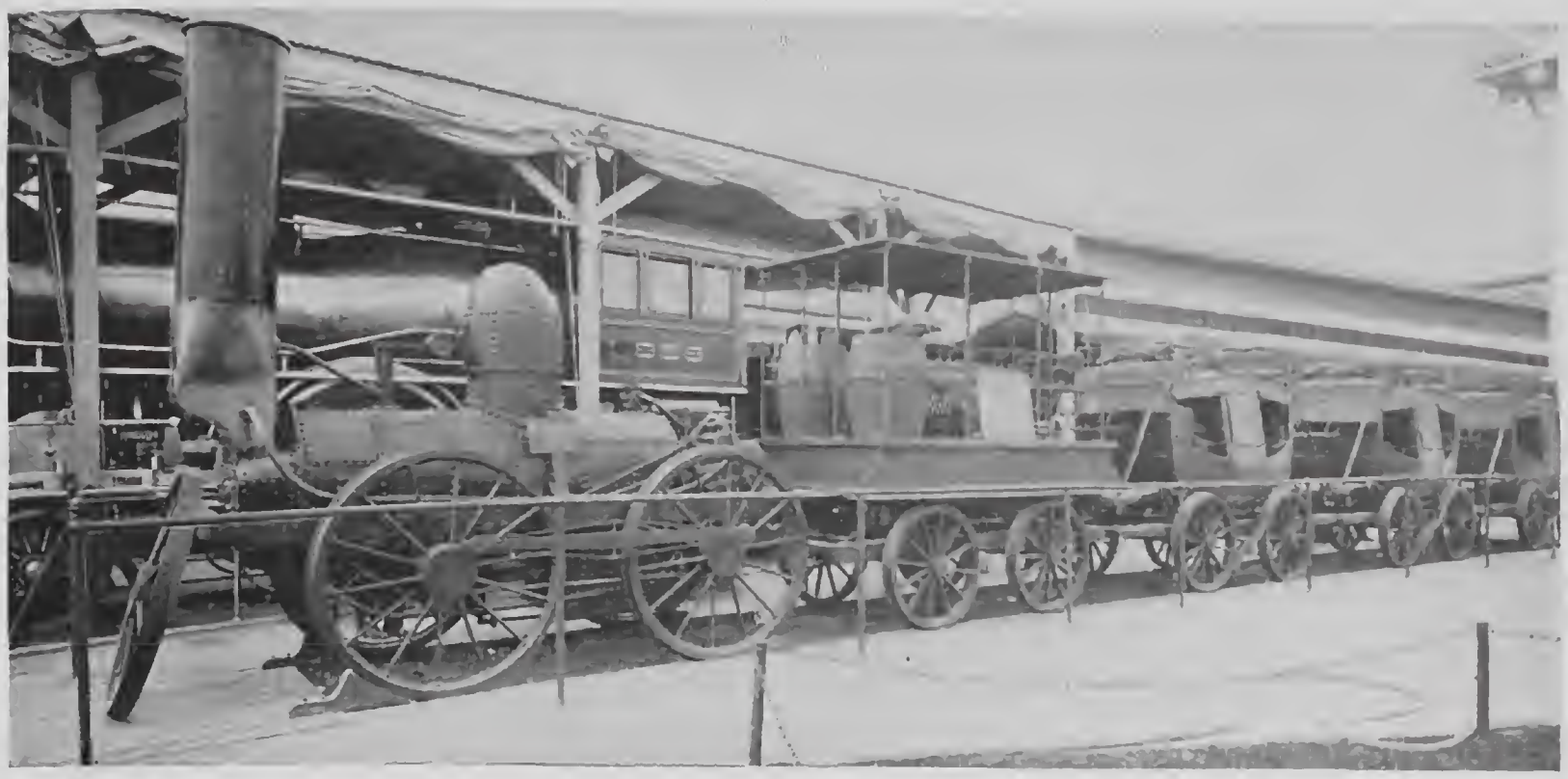
SMOKING CAR VESTIBULE TRAIN

of them an electric car with upper deck, such as are now in use at Washington. In the centre of the main building, fronting on the longitudinal nave, is a model of the workshops, stores, and dwellings of the town of Pullman, with its 12,000 inhabitants, more than half of whom are operatives actually employed at the works. Of these, further mention is made under the heading of World's Fair Miscellany.



DINING CAR, NEW YORK CENTRAL VESTIBULE TRAIN

South of the annex is the pavilion of the New York Central company, a separate edifice in the form of a triumphal arch connecting two side structures, one of them furnished as a waiting room, its walls hung with scenic paintings of landscape views from its lines of route, and the other serving as an office, where information is furnished as to the company's operations and exhibits. In the court between, with its flooring of mosaic, is a model of the Empire State express engine, *999*, the original of which is stationed on tracks outside the building. For this locomotive, which is said to be the fastest in the world, such impossible rates of speed have been claimed as a mile in 32 seconds or 112 miles to the hour. The *999*, built



LOCOMOTIVE "DE WITT CLINTON" AND TRAIN, PIONEER OF NEW YORK CENTRAL

for the occasion at the Schenectady Locomotive works, is an eight-wheel engine, long-limbed as a race-horse, with seven-foot driving-wheels, and of plain but handsome appearance. Beneath its huge boiler, with its heating surface of 1,700 square feet, there is room for a tall man to stand upright, while the diminutive smoke-stack is on a level with the curved roof which shelters the engineer. On the tender an inscription indicates the service for which it is destined, the engine and tender weighing together more than 100 tons, and yet running as smoothly as a drawing room coach. The accompanying train consists of Wagner vestibuled cars, and includes drawing room, sleeping, dining, and smoking coaches, most of them decorated in Louis Quatorze style, with elaborate carvings and color scheme of gold, yellow, and pale green.

In contrast with this steam leviathan and its train of palace cars, stands at its side a reproduction of the *De Witt Clinton* locomotive, with its ramshackle cars, the former having fallen to pieces years ago, though some of the fragments were pieced together and the engine reconstructed from the original specifications. For the coaches the following is a portion of a contract, dated the 23d of April, 1831: "To the commissioners of the Mohawk and Hudson Railroad company, Sirs:—I propose and agree to furnish for said railroad company six coach tops, to be finished and hung in the style of workmanship generally adopted in Albany and Troy for post coaches; a baggage rack and a boot to be hung at each end; the length of coach body to be 7 feet and 4 inches, 5 feet wide in the centre and 3 feet 8 inches between the jacks; to have three inside seats, the back of the end seats to be stuffed with moss and all the seats to be stuffed with hair. The whole to be completed



NO. 999, THE GREAT ENGINE OF THE NEW YORK CENTRAL COMPANY

DRAWING ROOM CAR, NEW YORK CENTRAL COMPANY

as aforesaid for the sum of $310 each. It is understood that the above coaches are not to be provided with lamps or mud leathers."

Here in truth we have the climax and anti-climax of railroad travel, in the palace cars of the Empire State express, costing perhaps $30,000 apiece, and these primitive coaches of three score years ago, costing about one hundredth part of that sum, with their moss-stuffed seats, and without lamps or "mud leathers." As to the engine there is nothing whereunto we can liken it, unless it be to an old fashioned machine that has stood in the rain since the days of the colonial era. Its boiler is hump backed; its tender filled with water barrels, and its overgrown smoke-stack is without spark-arrester, cinders falling in showers on the passengers, who protected themselves with umbrellas, and at times used their coats to extinguish incipient fires. Thus did the good citizens of New York, including Erastus Corning, Governor Yates, and the high constable of the state, travel on the pioneer trip from Albany to Schenectady on the 9th of August, 1831, the conductor seated in rear of the tender, and giving the signal to start by blowing a large tin horn. It may have been an interesting but it certainly was not a comfortable excursion; for we learn that the tops of the passengers' umbrellas were burned through, and that each one seized his neighbor's clothes to extinguish the brands that came from the pitch pine fuel, while, when a stop was made for water, the constant jerking caused by the slack of the cars was relieved by wedging rails between them and tying them fast with packing twine.



COACH OF "DE WITT CLINTON" TRAIN

Near the pavilion of the New York Central, the Pennsylvania Railroad company erected a tasteful edifice of its own, in the form of a passenger station, behind which a track was laid with standard rails, and a signal tower and foot bridge overhead. Here also was displayed a historic and technical collection, but relating only to lines which have been associated with or merged in its system, showing in models, relief maps, relics, and illustrations in graphic

PENNSYLVANIA RAILROAD COMPANY'S EXHIBIT

1. Conestoga, or emigrant wagon. 2. Model John Stevens locomotive, 1825, first in America. 3. Model Stockton and Darlington locomotive No. 1, brought from England to America in 1826. 4. Rack rail locomotive with cog gearing built for Madison and Indianapolis R. R. Co. 5. Locomotive "Lancaster," with stage cars; first steam train to run on Pennsylvania state railroad, 1834. 6. "George Washington," 1835; first locomotive to climb a heavy grade. 7. "Herald," Baltimore and Susquehanna railroad.

art, the results achieved by this organization, in which were consolidated, between 1846 and 1892 the interests of more than 200 corporations. At either side of the main entrance-way are depicted on panels in relief primitive and modern methods of travel and transportation for periods extending from 1492 to 1892. There are relief maps of termini and of the company's former and present lines, with relief models of Horse Shoe curve, and of cars, locomotives, and canal-boats. A perspective map, 33 feet long, shows the exact location of every train in its system at six o'clock in the evening of Columbus day, the 21st of October 1892. A chart explains some of the workings of the organization, and impressions from seals the gradual accretion of its corporate interests.

Among the models, most of them about one tenth of the actual size, are a stage coach that ran between Pittsburg and Philadelphia nearly 70 years ago, and a Conestoga wagon such as was used before the railroad



BUILDING OF PENNSYLVANIA RAILROAD COMPANY

era for eastward travel and transport to the Ohio and Mississippi valleys. Of locomotives there are among others models of the one which John Stevens built at Hoboken in 1825, and of the Stockton and Darlington engine *No. 1*, imported from England in 1826 by William Strickland, and loaned for the occasion by the Franklin institute of Philadelphia. There is the historic *John Bull*, its model made from the original drawings sent with the engine from Stephenson's works. After making the trip from New York to Chicago in somewhat less than a week, the engine itself with its two old-fashioned cars was installed in the yards at the terminal station near the Administration building, thus reproducing the first train drawn by a locomotive in New Jersey,



THE OLD "JOHN BULL" ENGINE AND TRAIN

the date being the 12th of November, 1831. There is also a rack-rail locomotive constructed for the Madison and Indianapolis railroad, near which are the *Herald*, which did service on the Baltimore and Susquehanna road in 1831, and the *George Washington*, built in 1835, the first to ascend a heavy grade.

Among the models of passenger and freight cars are two stage-body coaches, originally drawn by horse power, and which, with the engine *Lancaster*, formed the first train run on the Pennsylvania State railroad in 1834. There is one that plied in the same year between the business quarter of Philadelphia and the ferry across the Schuylkill river. To this date also belongs the first car with shingled gable roof, and with straight-backed seats, in which none but a quaker could sit. Of freight cars there is one which did service in 1836, and there is a baggage car built in 1849, the baggage being placed in wheeled crates and carried across ferries without removal.

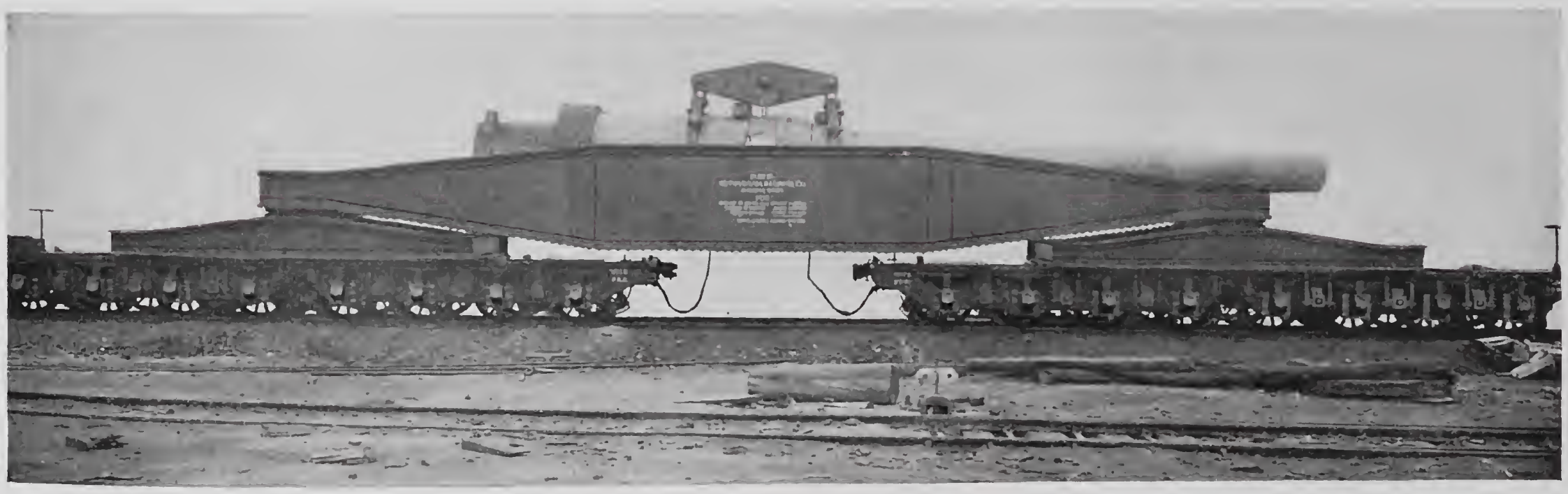


MODELS OF "JOHN BULL" AND KRUPP GUN

Finally, there are the original cars, built specially for the purpose, by which the Krupp guns were hauled to Jackson park, with models of the guns upon them.

Safety appliances are shown, with train-signals, lanterns, and color-blind tests. There are lay figures of trainmen, conductors, brakemen, and other employés in uniform. There are models of tracks laid between 1831 and 1857. There are tug-boats, a ferry boat, lighter, and barge, whose achievements date from 1839 to 1892. There is hoisting machinery by which a 3,000 ton vessel can be loaded in four hours, and there is a model of the first railroad bridge constructed in Pennsylvania, with spans of timber nearly 1,000 feet in length.

In cases and frames is a large museum of railroad relics and curiosities, including more than 1,000 specimens. Among them are rails and chairs laid in 1833; the whistle used by a driver on the old state road in 1832, when cars were run by horse-power; an old copper penny that helped to purchase the first ticket sold in the same year by the Camden and Amboy railroad; the ticket punch which a conductor used in 1849; a baggage check of similar date; a conductor's badge and tariff book of 1853, and the first guide book published by the Pennsylvania railroad in 1855. There are the wood-burning stoves used in passenger cars, the old fashioned signal lanterns, and the bells which for nearly half a century announced the arrival and departure of trains and steamers. Railroad literature is freely displayed, with reports, regulations, pamphlets, instructions,



CARS USED FOR TRANSPORTATION OF KRUPP GUN

pay-rolls, schedules, train-orders, way-bills, and advertisements, among the last a poster of 1792, advertising the "New Line Industry" by stage and sail boat from Paules Hook, now Jersey City, to Philadelphia. A so-called blank African ticket, issued in 1861, guarantees "that the person of color mentioned below is free, or is the slave of the party designated, and he has the permission of the said owner or owners to travel in the cars."

A collection of old views on Pennsylvania lines dates from 1832 to 1892. Among them is shown the wooden bridge built over the Schuylkill river in 1804, and used by vehicles, foot passengers, and later by railroads until its destruction by fire in 1875. On the Old Portage railroad is a train of freight cars being drawn up an incline by cable, behind it a "buck" or safety car, and at the summit an engine house and hitching shed. A stage coach is changing horses at a Pennsylvania tavern in 1825, and here again are *John Bull*, and the old



THE WAR ENGINE "GENERAL"

exhibits the first locomotive built for its line in 1858, and a passenger coach that ran in 1835 between Boston and Providence, modelled after the stage coaches of the time, hung on braces, and resting on a four-wheel truck. In contrast with it is one of the last engines and passenger cars constructed for the company.

By other railroad companies historic engines have been placed on exposition, the Illinois Central for instance installing near the exhibit of the Pennsylvania company the *Mississippi*, built in England in 1836 for the Natchez and Mississippi line, now incorporated with its system. After doing service on several lines, in 1868 it was carried away by a flood, and after lying buried for ten years under a mass of débris was exhumed and repaired for further service. It is an odd-looking relic, and has been aptly compared to a boy's penknife which has several times been fitted with new blades and handle. On timbers beside it are specimens of the strap rails used on the Natchez and Hamburg line, on which this locomotive ran between 1836 and 1838.

Near the German section, in the north of the annex, the Chicago and North Western has on exhibition the *Pioneer*, so named as the first engine used on a Chicago road, one shipped by way of the lakes nearly half a century ago, when no railroad ran eastward from the midcontinent metropolis. Built in Philadelphia, in 1836, for the Utica and Schenectady line, a few years later it was purchased for the Galena and Chicago Union railway, then in course of construction. Here also is one of the quaintest of specimens, its smoke stack towering above the diminutive boiler and cylinders, with a single pair of driving wheels, and all its apparatus of most primitive pattern. Still another historic locomotive is the *General*, exhibited by the Nashville Chattanooga and St Louis railroad, by whose manager it was rescued from a limbo of refuse not far from the spot where it was captured by a band of confederate raiders in April 1862. Of this incident the story is briefly told under the heading of World's Fair Miscellany.

Of modern specimens displayed in the American sections of the Transportation department, aside from those already fashioned Conestoga wagons, with coaches, canal boats, and packets. There are locomotives of many patterns and dates, and the letters patent signed by Andrew Jackson and Martin Van Buren in 1831, granting exclusive rights for "a new and useful improvement in locomotive carriages and rails adapted thereto." The railroad riots at Pittsburgh in 1877 are depictured in graphic art, as also is the devastation wrought by the Johnstown flood in 1889. In drawings, photographs, and other forms are illustrated engineering work, construction, and maintenance, with bridges of iron, wood, and stone; stations, tunnels, cuts, canals, and floating equipment. In addition to this elaborate display the company occupies a small section in the annex of the Transportation building, where are passenger, refrigerator, and inspection cars of improved and recent pattern.

In an adjacent section the Old Colony railroad



BUFFET AND LIBRARY NEW YORK CENTRAL TRAIN



SLEEPING CAR IN WHITE AND GOLD

mentioned, the largest collection is from the Baldwin Locomotive works at Philadelphia, consisting of fifteen engines adapted to all varieties of service, including broad and narrow gauge, simple expansion, and compound locomotives, with such as are used on mines and plantations. The Brooks Locomotive works of Dunkirk, the Schenectady and the Pittsburg works, are also well represented, the Schenectady works having one of the largest engines in the annex. The Cooke Locomotive and Machine company, of Paterson, New Jersey, sends a freight and a passenger engine; from Lima works in Ohio come a logging engine and car; the Rhode Island works at Providence, and the Rogers works at Paterson, New Jersey, have each three engines on exhibition, and from the Richmond works is a locomotive of finished workmanship. Finally, the H. K. Porter and company's works at Pittsburg show some of the smallest engines used for special purposes, but equipped with all modern appliances.

Among foreign participants Great Britain occupies a prominent section in the annex, facing that of the Baltimore and Ohio railroad. Though somewhat limited, the display is of historic as well as of practical interest,



PAVILION OF NEW YORK CENTRAL RAILROAD COMPANY

for England is the mother of railroads, and by her have been furnished, almost from Stephenson's days, the types for many European systems. Here one may study a full-sized model of the *Rocket*, which on a September day of 1825 dragged between Stockton and Darlington a heterogeneous procession of vehicles, from a hucksters' wagon to a family coach. As all the world knows, it was driven by the Scotch engineer who, beginning life as a cowherd and at eighteen unable to read or write, gave to the world an invention which revolutionized its commercial and industrial conditions. Though conveying passengers from Stockton to Darlington at the rate of one shilling a head, the line was mainly used for carrying minerals and merchandise, at once reducing the freight on the former by more than 70 per cent, and on the latter by 90 per cent. Such was a foretaste of the great work which railroads were destined to accomplish.

On the completion of the Liverpool and Manchester line in 1829, it became apparent that ere long a transformation would be wrought in methods of travel and transport. Others followed, slowly at first, and then in more rapid succession, so that before the middle of the century the foundation had been laid of all the great trunk lines interlacing the British isles. In 1853 there were nearly 8,000 miles in operation; in 1873 this

mileage had been doubled, and at the close of 1893 more than 20,000 miles were open, railroad construction having almost reached its limit as it would seem, for there were few more lines to build, or few that would pay to build. The entire capital invested in these enterprises is not far short of $5,000,000,000, the gross revenue from which exceeds $400,000,000, or at the rate of $20,000 a mile, while in the United States, though with nearly thrice the total of earnings, the average is less than $8,000 a mile.

A feature in British as compared with American railroads is their enormous cost, amounting with less than one eighth of the mileage to more than one half of the outlay incurred by the latter. This is due in part to the substantial character of English road-beds, but more to the expenditure for right of way, much of it passing through towns and cities, or thickly populated regions, and purchased at fabulous prices. The Metropolitan railway, for instance, built partially underground, cost at the rate of $2,500,000 a mile, and the North London, constructed mainly on arches, $1,635,000 a mile. Yet both these lines are paying properties, the latter requiring nearly 1,000 passenger coaches and several hundred freight cars for its dozen miles of track. In the United States railroads have been built within recent years at a cost of $15,000 a mile, while for the most expensive sections of the Central Pacific, over and through the Sierra Nevada, the outlay was not more than $150,000 a mile. Nevertheless, as an investment, British railways pay better than our own, averaging about five per cent on ordinary stock against less than two per cent in the United States. Another contrast is in the proportion of employés, with twenty men to each mile of British road against five in the United States. To the insufficiency of their working force is mainly due the large number of casualties on American lines, amounting to nearly 10,000 a year, more men being killed in 1893 than met their fate in the federal ranks during the three days' struggle at Gettysburg.

In the *Queen Empress* with its train of cars, exhibited by the London and North Western company, we have the most perfect types of rolling stock developed by British ingenuity. While there are larger and more

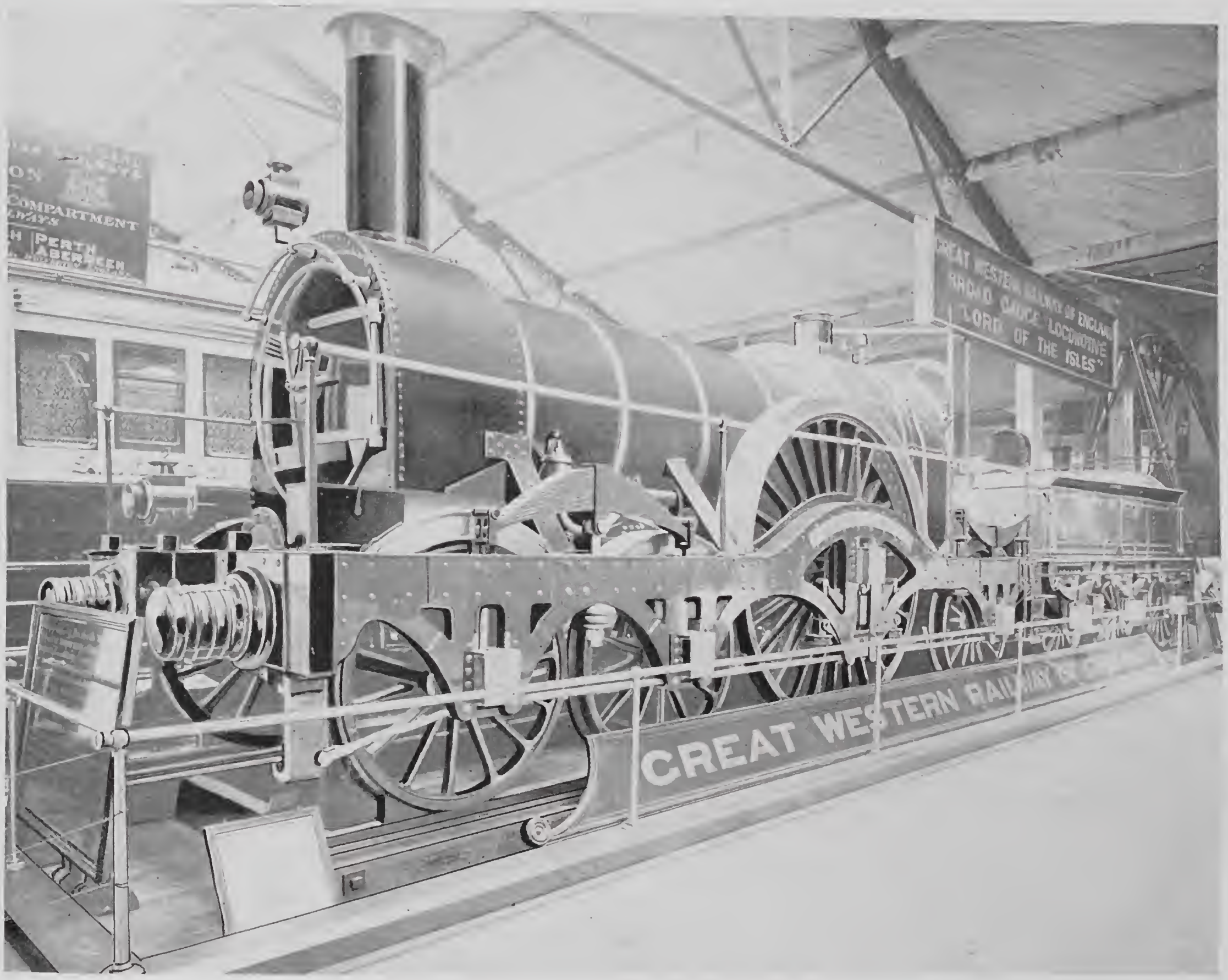


THE FAMOUS ENGLISH LOCOMOTIVE, "QUEEN EMPRESS"

powerful locomotives in the American section, there are none of more handsome appearance and more elaborate finish. Not only are the iron and steel polished to a mirror-like brightness, but the painted portions resemble the finest cabinet work, even the pipes of the smoke box being varnished, while the tube plate is of snowy whiteness. The engine itself is of a blue color, with stripes of red and edgings of green. Its weight is about 52 tons, and a novelty in its construction is that the high-pressure cylinders are placed in front of the forward driving wheels, with corresponding length of piston rods. There are more than 150 boiler tubes, with a total heating surface of some 1,350 square feet, and a steam pressure of 175 pounds to the inch.

The sleeping car contrasts somewhat sharply with those of American build, affording almost the privacy of a home, with broad, cushioned seat provided with arm rests and baggage rack for every passenger, the sleeping berths with wardrobes underneath, and each with separate lavatory and electric communication. In the centre of the car, and connected by a side aisle with either end, is a smoking room, finished in walnut and

satin wood, with easy chairs and folding tables. The composite car contains first, second, and third class compartments, the principal difference being as to finish, for all are well upholstered and comfortably furnished. Among other exhibits by the London and North Western are models, signal apparatus, and scenic views along



MAMMOTH LOCOMOTIVE OF THE GREAT WESTERN RAILWAY, ENGLAND

its line of route, the first including reproductions of the *Rocket*, and of a Trevithick engine, the first to run on a tramway between Merthyr and Cardiff, some ninety years ago.

The Great Western Railway company has on exhibition the *Lord of the Isles*, built for broad gauge lines, and partly to show their superiority over those of narrow gauge. This is a type of the first express engine ever constructed, others having been used for nearly half a century, and then retired only on account of a change in the standard gauge. From this company are specimens of the track used many years ago, one of the rails weighing only 62 pounds to the yard, but laid on longitudinal sleepers and with continuous supports, enabling it to carry as much weight as the modern rail by which it was superseded, mainly because of the lower price of iron, and the higher cost of timber. There are also photographic views and portraits, among them



THE CANADIAN PACIFIC ENGINE, "626"

one of Brunel, the artificer of the *Great Eastern*, and in 1825 resident engineer of the Thames tunnel.

By the London firm of Westwood and Winby is exhibited the locomotive *James Toleman*, built for handling fast and heavy trains. In the mechanism of this engine there are special contrivances for combining speed and power, the driving wheels for instance having separate cylinders, with long piston rod for the transmission of power. The boiler is of unusual size, with a total heating surface, including fire box, of 2,000 square feet, and narrow enough in horizontal diameter to be placed between the driving wheels. The bearings are large, the connections strong, and the entire engine is a handsome specimen of workmanship, but with a complication of parts that must render difficult the task of keeping it in order. From Sir John Fowler and Sir Benjamin Baker are fine models of the bridge across the Forth, and from other companies are models and photographs of rolling stock, buildings, equipments, and the scenery along their lines of route.

Side by side with the exhibition train of the London and North Western is a full standard train of the Canadian Pacific railway, built at its works in Montreal, and showing the actual service of the company, with



GENERAL VIEW JACKSON PARK

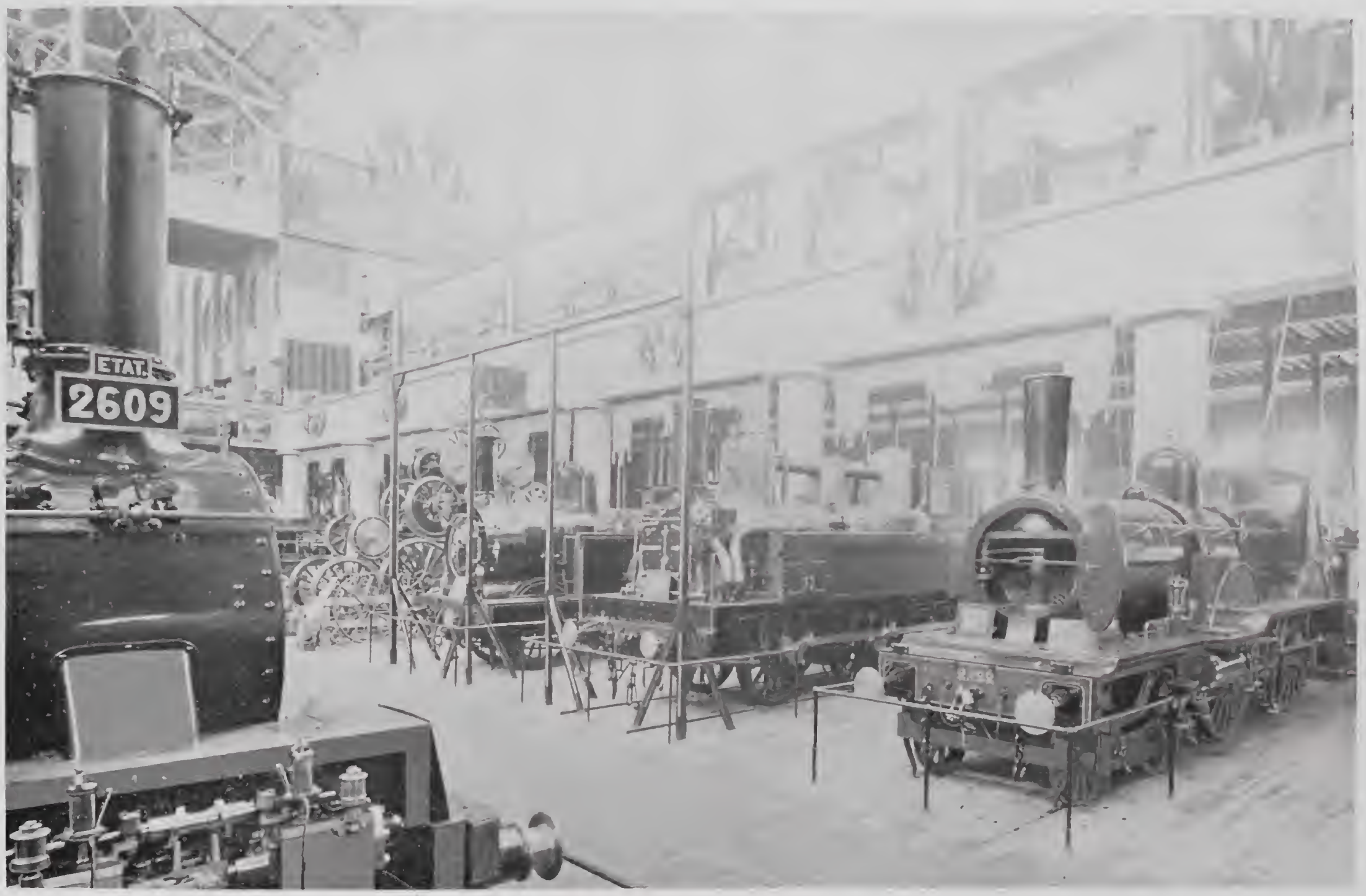
the accommodation furnished to passengers. At its head is a compound engine weighing 106 tons, with steel boiler carrying a pressure of 180 pounds to the inch. As with most of the steam leviathans housed in the annex, it is plainly finished, and of sombre hue, the tender painted black, with red facing and gold bordered panel. The baggage car is of the usual type adopted by the company, strong and solid, as are all the rest. Next to it is a second class sleeper, with leather covered seats arranged at night as berths as on the Pullman cars. Then comes a first class day coach, upholstered in wine-colored plush, and finished in Honduras mahogany, elaborately carved and with tasteful panellings. Arches resting on columns divide the car into sections without obstructing the view, and give to it a massive appearance. At either end is a smoking room, of which only the one in rear of the car is used when the train is running.

In the dining car, whose floor is heavily carpeted, are ten tables, with carved bronze alcoves, their seats covered with morocco leather, and with a rounded pillar at the back and end of each. The sideboard is an elaborate piece of furniture, rounded at the base, with plate glass panels, its handsomely carved octagonal top resting on massive columns. The last car is a first class sleeper, with ornate and elegant finish, its main body divided into eight sections, and at one end are state rooms with linings and curtains of richly flowered silk, connected with which is a toilet room with plate glass mirrors. The cars can be lighted either by gas or electricity, and are heated by steam from the engine. In maps is described the company's route around the world, and in graphic art is reproduced some of the finest scenery on this the most picturesque of American

railroad lines. From the bureau of public roads are also maps and photographs of road ways, bridges, and tunnels, and from private exhibitors collections of railway supplies.

Adjoining the British section on the northwest, New South Wales has condensed much that is of interest within a limited space. The hansom cabs, with their ingenious sliding doors, are specimens of excellent workmanship, and a collection of photographs gives the stranger to Australian enterprise a most favorable impression of the railway stations of Sydney, Albury, Newcastle, and other centres of the system, as well as of its bridges and rolling stock. A large model of the Zigzag railway shows the line winding around and climbing the sides of the Blue mountains, one of the remarkable engineering feats of modern times. Near by are models of the steamships *Australasian* and *Glasgow*, and in the far end of the section are reproduced the Sutherland dry docks at Sydney, among the most extensive in the world. At the other side of the annex is a large pile of railway sleepers, made of iron bark wood, many of which have done service for nearly a quarter of a century.

Germany occupies a liberal space at the southern end of the annex, where are well represented the railway interests of the empire. The first of the German lines was completed in 1835, and of Prussian lines in

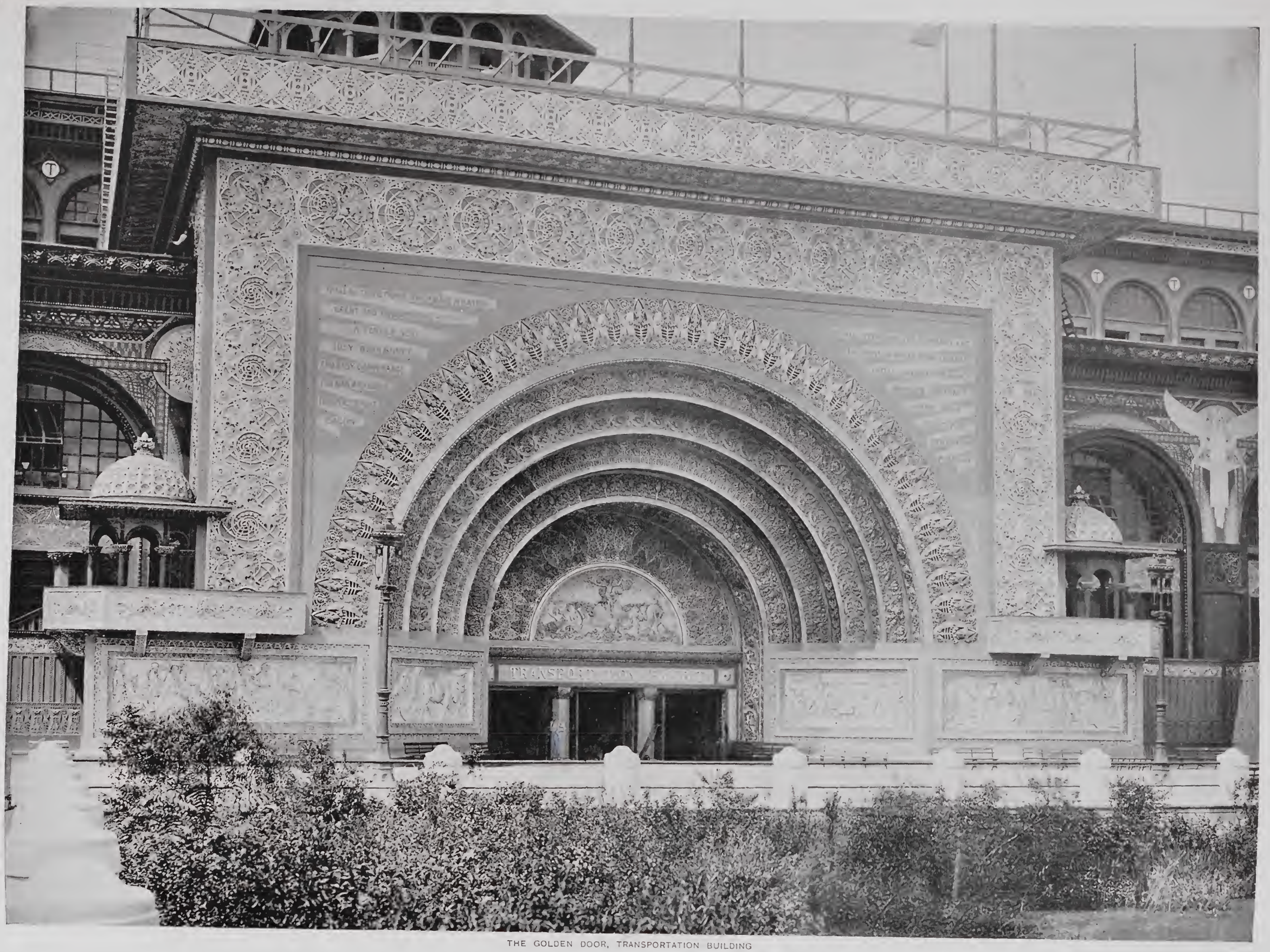


FRENCH AND BELGIAN LOCOMOTIVES

1839; but while the Prussian government encouraged railway development, and a decade later undertook the construction of railways of its own, it was not until recent years that her system was fully developed. In 1879 was authorized the purchase of private lines by the state, which in 1885 owned nearly all of the 14,000 miles of roadway. In 1892 there was double that mileage in operation, with 14,300 locomotives, 27,000 passenger, and 300,000 freight and baggage cars, the total earnings amounting to $480,000,000, and the net earnings to 43 per cent of that sum; but in which, as in other countries, fixed charges as interest on bonds are not included.

First among the German exhibits may be mentioned that of the Royal Prussian state railway administration, at Berlin, consisting mainly of locomotives and passenger and freight cars manufactured in the principal railroad works of the empire. The first include a compound freight engine and tender from the Elbing shops of F. Schichau, and a locomotive with five-ton axle pressure from Henschel and son of Cassel. Among the rolling stock are three and four truck railway carriages, and a coal car with iron body, the last from a Cologne-Deutz firm.

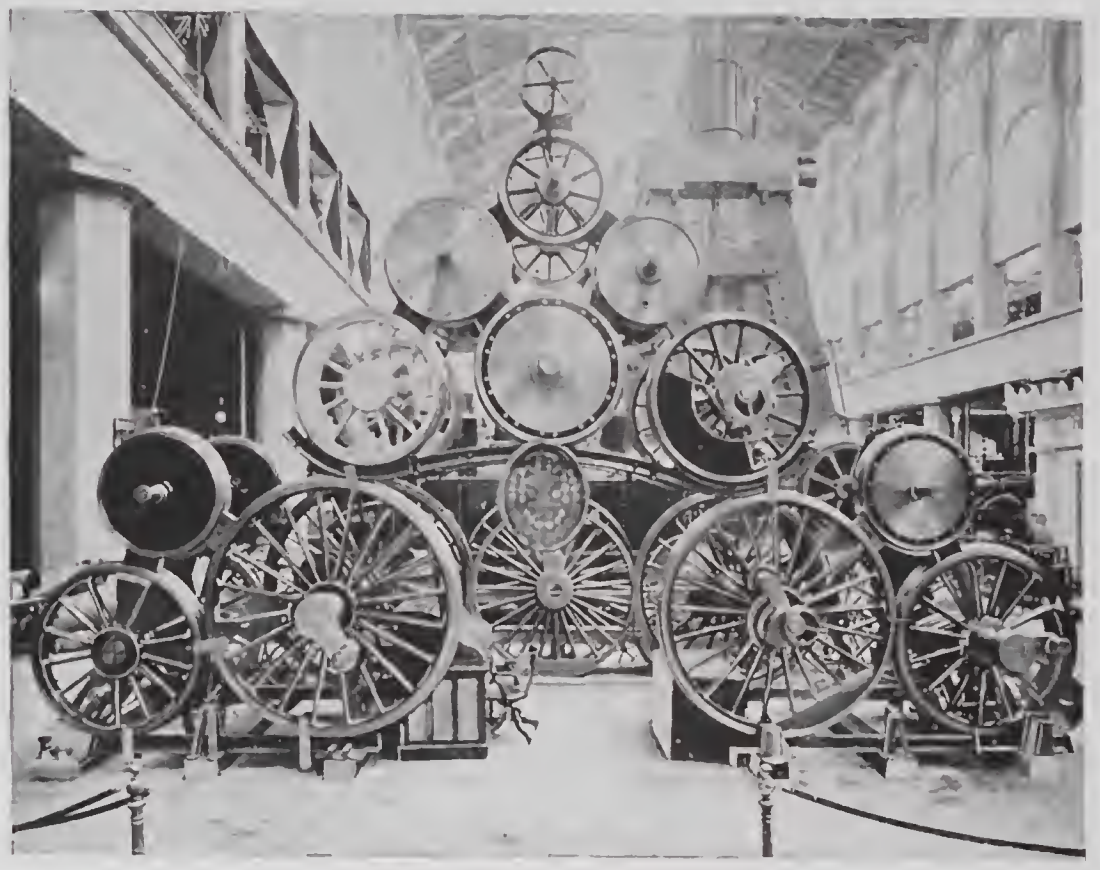
By Siemens and Halske of Berlin and Chicago are displayed all kinds of apparatus used for signalling, and for the operation and interlocking of railroad switches. Among them are two illustrations of their electro-manual system of block signalling, one adapted to German and the other to American lines, the principal features being the same in each, as with other apparatus, some of which has been in continuous service for many years. All the signals are controlled by the same instrument, and by an ingenious contrivance the electric circuit is connected with each of the rails, preventing the operator from unlocking the signal to the rear,



THE GOLDEN DOOR, TRANSPORTATION BUILDING

and thus avoiding a source of danger in manual block systems. And so with the track signal, which can be placed at any distance in advance of the signal tower, and has doubtless prevented many a collision. The same company exhibits an electric automatic system of block signals, and in Machinery hall has one of the most elaborate collections in the German department.

From the museum of Permanent Way, at Osnabrück, is a collection gathered from every quarter of the world, showing the roadways of many nations and periods, arranged chronologically and in groups. First is a specimen of the plank road named by Tacitus Pontes longi, laid by Domitius about the year five B.C., as a portion of a Roman military road across a swamp near Osnabrück, and excavated in 1892 from its dense overgrowth of moss. Next is a wooden tramway, such as is still used in remote and sparsely settled regions. Then there are exhibits of stone, wood, and iron sleepers and rails, either as originals or reproductions, from the track on which Richard Trevithick experimented in 1804 to that which was laid in 1890 for Prussian state railways. There are self-bearing rails without sleepers and joltless permanent way of various kinds, operated at small expense, with other appliances for comfort and safety, illustrating many phases of construction both as to economy and technique.



TROPHY OF FRENCH CAR WHEELS



WOODEN TRAMWAY AND FIRST SWITCH. USED IN HUNGARY. FROM OSNABRÜCK MUSEUM, GERMANY

In a superbly executed model is reproduced the railway station at Cologne, one of the finest specimens of railroad architecture in the world, 80 feet high, and with a central span of more than 200 feet. Near the northern portal of the Transportation building are sets of wheels for locomotives and cars, pressed castings and welded iron plates, with models of public and other works constructed by a Bergbau company, which, as it states, employs 7,600 men in the production of 250,000 tons a year of manufactured iron and steel.

In France railroad development has been largely aided by the state, which furnished one-half the cost of the earlier lines constructed, equipped, and worked by private enterprise. In the larger corporations were for the most part absorbed the local roads afterward built under government patronage, and in 1884 a contract was made with the six great companies for 7,000 miles of roadway in addition to the 17,000 miles then in operation, to be built at their own expense and the money ultimately refunded by the state, which meanwhile guaranteed a fair dividend to stockholders. These were not all completed, as it would seem, in 1891, when the total length of track was somewhat less than 20,000 miles. From all French railways the revenue for that year was stated at about $230,000,000, of which nearly one half was net income; for in France railroads are managed with the closest economy.

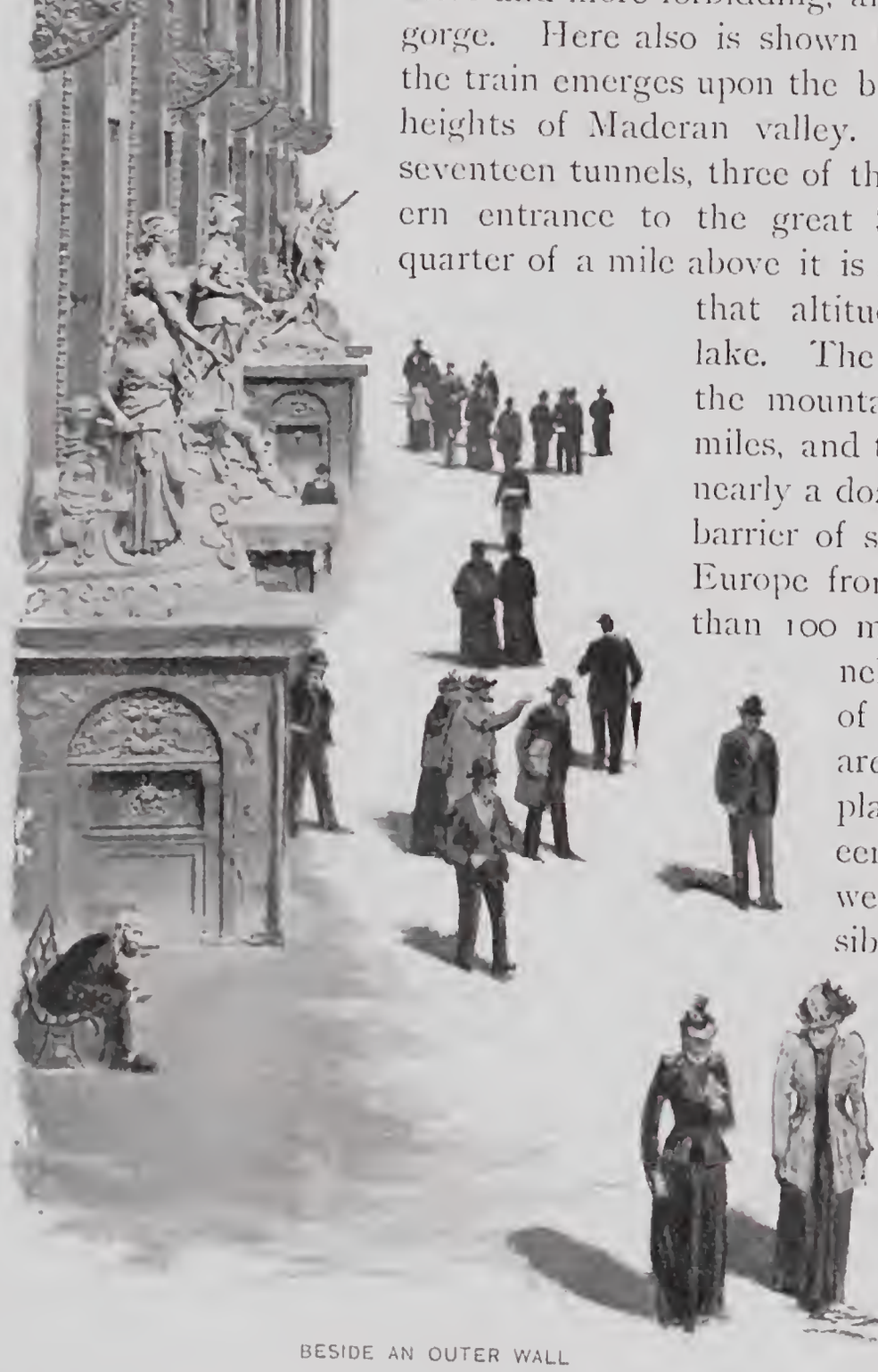
In the French section, adjoining the main portal of Transportation hall, there are no such monster locomotives as are exhibited in the American and British departments. Of the four engines the average weight does not exceed 45 tons, and the average cost about $15,000. Of rolling stock the only specimen is a neat, second class coach, used for local and suburban traffic, with seats across the body of



CORNER OF MEXICAN CENTRAL RAILROAD PAVILION

the car and a stairway leading to the roof. The Northern and Western railways of France have special sections in which the extent of their systems is explained, as also their facilities for handling freight and passenger traffic. The latter has a model of the St Lazare station at Paris, showing the passenger depot, the long train sheds and freight houses, the depressed tracks, and the city streets which traverse the area partially occupied by the company's buildings and lines. Elsewhere a manufacturer of railway supplies advertises his wares in a monumental pile of axles tires and wheels.

Austria-Hungary with her 17,000 miles of railroad is represented in the Transportation building only by photographs of freight and passenger cars, and a few exhibits of vehicles. On the northern walls of this building is a gallery of paintings, with relief maps illustrating the scenery and topographical peculiarities along the line of the St Gothard railway, the engineering link connecting the Swiss and Italian lakes and the railway systems of northern Europe with those of the south. Here are still traces of the havoc wrought by the landslide from Rossberg mountain, which more than eighty years ago crushed entire villages like egg shells. Along the shores of Uri lake, the southeasterly arm of Lucerne, the windings of the railway may be partially traced, losing itself in mountain tunnels, the rocks and peaks becoming more and more forbidding, and the valley narrowing to a gorge. Here also is shown Mount Bristen, from which the train emerges upon the bridge which spans the dizzy heights of Maderan valley. Then follows a series of seventeen tunnels, three of them circular, and the northern entrance to the great St Gothard is reached. A quarter of a mile above it is a little village, and at twice that altitude, a miniature mountain lake. The main tunnel runs through the mountains for a distance of nine miles, and the entire railway, which for nearly a dozen years has traversed the barrier of snow peaks dividing central Europe from northern Italy, is more than 100 miles in length, the 56 tunnels covering about one third of the total distance. There are also illustrations of the plans adopted by the engineers, showing how valley levels were followed, wherever possible, in the construction of the great work. Models made by a professor of the Federal polytechnic at Zurich are works of art in themselves, the ideas of relative depression and elevation being conveyed in gradations of color as well as in form, blue for the valleys, and orange for the hills and mountains.



BESIDE AN OUTER WALL

Entering the Mexican section near the United States exhibit of vehicles, we are confronted with the typical horseman of our sister republic, with wide sombrero and mounted on a profusely caparisoned steed. Near by are specimens of saddlery and wagon



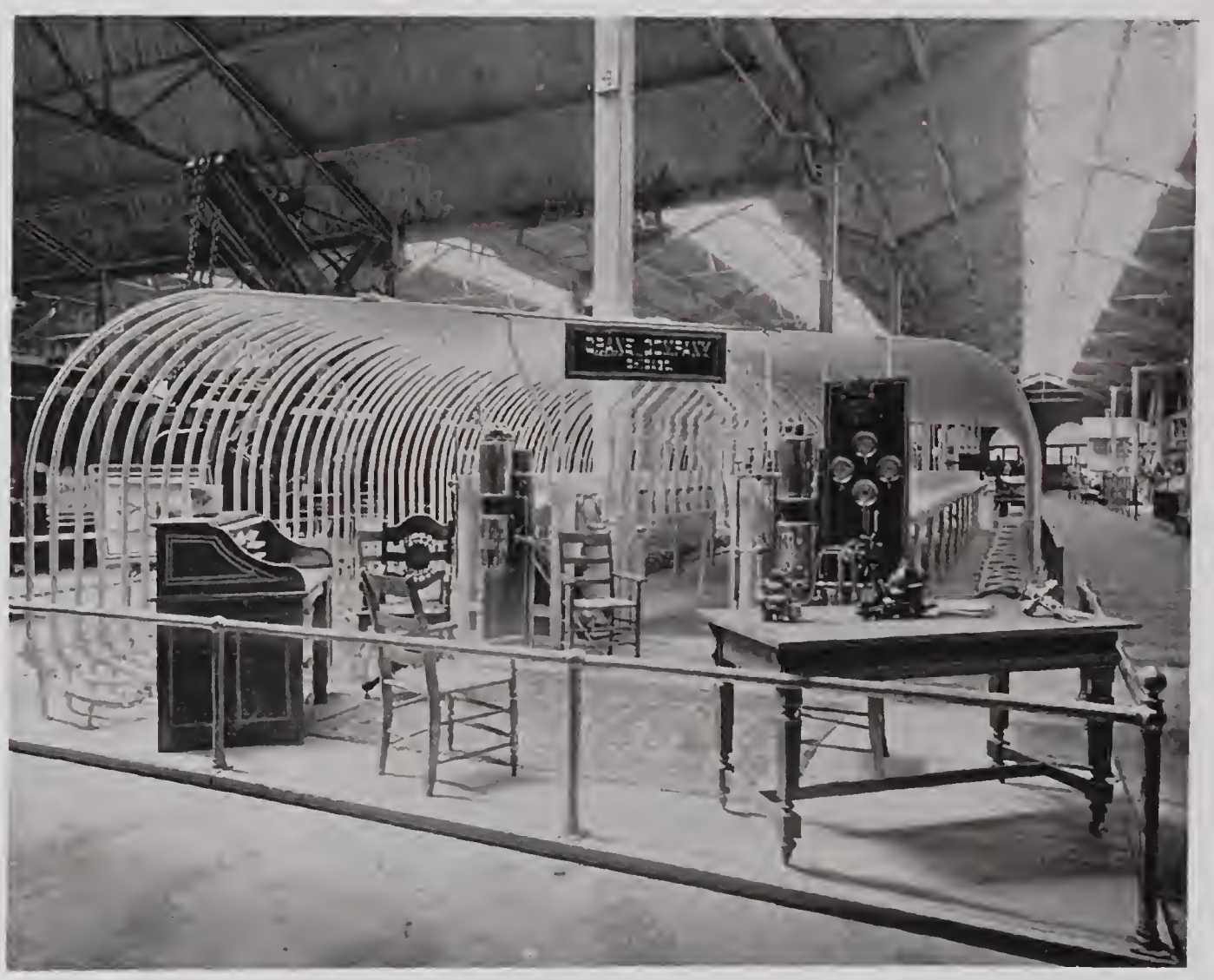
ROSTRAL COLUMN, SURMOUNTED BY STATUE OF NEPTUNE

work, both of skilful execution. In one of the corners is a replica of the so-called stone sails near the summit of the hill of Guadalupe, in the neighborhood of which stands the temple of Our Lady of Guadalupe, whither, as the legend runs, a party of shipwrecked sailors, in fulfilment of a vow, bore the foremast of their ship, planting the transformed emblem of their devotion where now it stands. Of this curiosity there is an exact reproduction by the Mexican National railroad, except that it is some twenty feet lower than the original. The company's office is decorated with ancient pottery, casts of Mexican gods, and figures exhumed from the sculptured ruins of Aztec and Toltec civilizations. The Mexican Central has its headquarters in another corner of the section, and in a separate chamber, in the form of a miniature museum, shows in maps its lines of route. Along the walls are tiny painted figures of water-carriers, and other agents and agencies of transportation, with objects that have no connection therewith, as the kitchen of a peon's home, a convivial lover embracing his sweetheart, and a drunken husband arraigned before a Mexican justice.



EXHIBIT OF MODEL TICKET OFFICE

Southeast of the central court is a large area in which our manufacturers display the multitude of articles classified as railway supplies, the range varying from such as are required for a passenger coach to the outfit of a railroad depot. From various establishments are such specialties as seats of wood, rattan, and metal for cars and stations, with folding beds, ceilings, panels, ornamental trimmings, and lighting apparatus. Of the two last there is a creditable display by the Adams and Westlake company, of Chicago, in a handsome pavilion whose decorations are mainly composed of the bronze, brass, and white metal trimmings now largely used for cars of elaborate workmanship. There is also a complete collection of headlights, signal lamps, and lanterns. Near by is the large model of the city of Pullman, mentioned in connection with the railroad exhibit of the Palace Car company, and adjoining this the publishing firm of Rand, McNally and company has a specimen ticket office, which is a bureau of information as well as an advertisement of the special classes of goods that the house supplies, as railway maps, tickets, punches, cases, and baggage checks. Upon the outer wall of this structure, which is shared with the Pullman company, is a large map of the United States, showing its complicated railway systems, and beside it the electrotype from which it was printed.



DISPLAY OF RAILWAY AIR BRAKES

In the section devoted to railway supplies, several bridge companies exhibit models and drawings of the structures which they have built, among them being a reproduction of the bridge thrown across the Mississippi

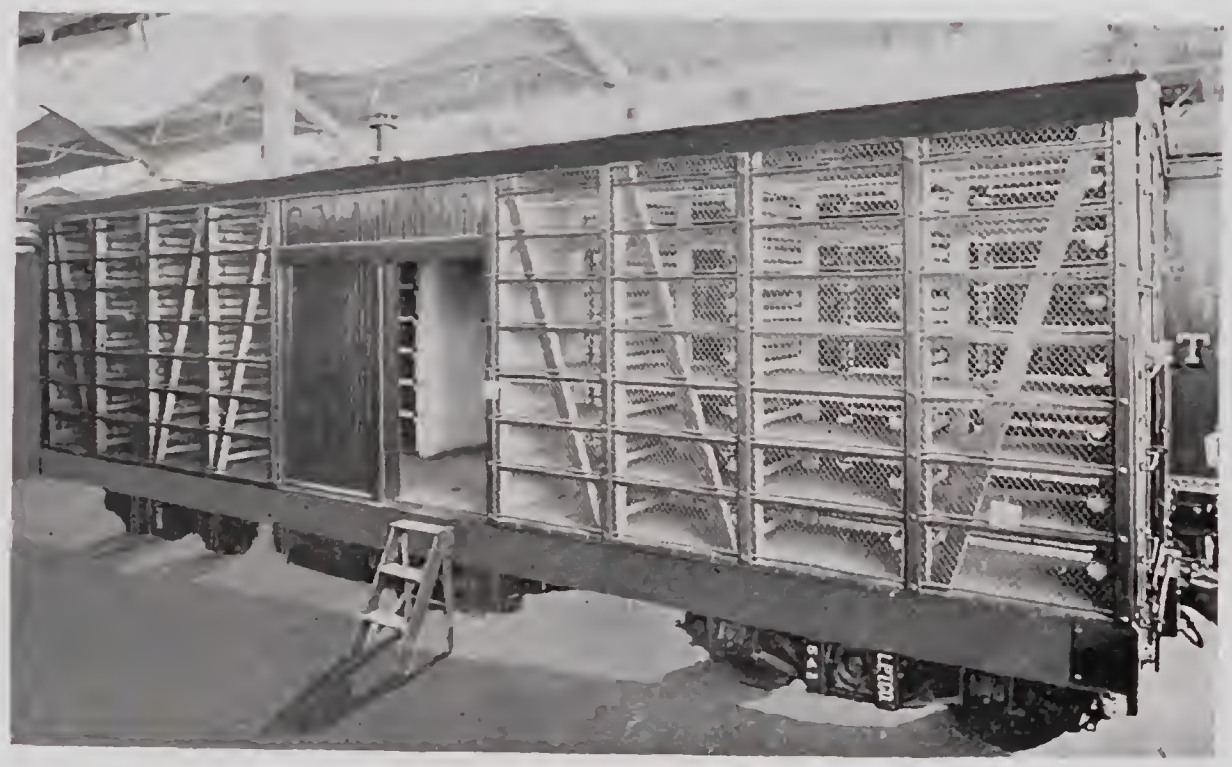
river at the city of Memphis, the only one below the mouth of the Ohio river. Opposite is a finely constructed model of the bridge over the firth of Forth, the pride of British engineers. In the western gallery a prominent engineer traces in a series of drawings the evolution of the American bridge.



THE PIONEER CABLE TRAIN

Under the group of railway supplies are classed the exhibits of air brakes of the many patterns now in use. The largest collection is that of the Westinghouse Air Brake company, which has a brilliantly lighted pavilion and a liberal space in which to display in working order its numerous specimens. It has also a train of cars, supplied with the latest apparatus, and furnished with compressed air pumped from Machinery hall, that the brakes may be seen in actual operation. Several companies have special apparatus for heating and lighting cars, the entire side of a long aisle in the annex being occupied with this class of exhibits. Two New York establishments make the most extensive showing, one of them illustrating not only its specialties for heating by steam but what is known as the Pintsch method of lighting by gas.

Among the miscellaneous features of the railroad exhibit there are few more attractive than that of snow ploughs. Of these there are several specimens within and outside the annex, the most noteworthy being the rotary snow plow used by the Atchison Topeka and Santa Fé company. It consists of a ponderous engine, with huge automatic reversible knives and hollow cone-shaped scoops; and one may well believe that the heaviest snowdrifts in the cañons of the Rocky mountains cannot long resist its onslaught. It has been thoroughly tested, and in a collection of photographs the plough is shown battling its way at various points through towering masses of snow.



FOR TRANSPORTING LIVE POULTRY

Bicycle electric cars are among the new inventions exhibited in the railroad department. In some of them the wheel is so large as to protrude through the roof of the car; in others there is a smaller central and vertical wheel, with two which run horizontally upon side tracks. The efforts to avoid friction, both of atmosphere and rail, are illustrated by several mechanisms. One of the devices is a cigar-shaped car; and there are at least two electric railways over which it is proposed to run trains suspended from the rails, rather than resting upon them. Through one of the contrivances it is claimed that a speed may safely be developed of 200 miles an hour, the central idea being the action of a bevelled drive wheel against a bevelled rail. On the top of the supporting trusses is a steel trough, sloping upward and outward from the centre, in which travel the truck and anti-friction wheels whence the car is suspended. The invention has been tested on a small scale, and even with imperfect roadway and electric motor it is said that a speed of over 40 miles an hour has been attained.



AN INSPECTOR'S STEAM HAND CAR

Although the exhibits of railroads proper completely dwarf those of the street car and minor lines, much is to be seen and learned by an examination of the latter groups; for here are displayed the latest patents in seats, stoves, wheels, switches, and all other appliances. Electric motors and the furnishings of electric cars are largely represented, together with all kinds of cable systems. In the latter direction San Francisco is prominent, A. S. Haliddie of that city, the inventor and builder of the first cable road, producing the original dummy used on a steep hill grade in August, 1873.

In a section of the roadway are also revealed the workings of the grip and pulleys, and adjoining is a collection of grips used by various cable lines throughout the country, showing difference in style and mechanism. A California company, which manufactures wire cables, has a patent rope-way in operation, one devised for the transportation of ore over the mountains, and a Chicago establishment exhibits a motor operated by liquid ammonia supplied by stationary plants.



SPECIMEN CARRIAGE EXHIBIT

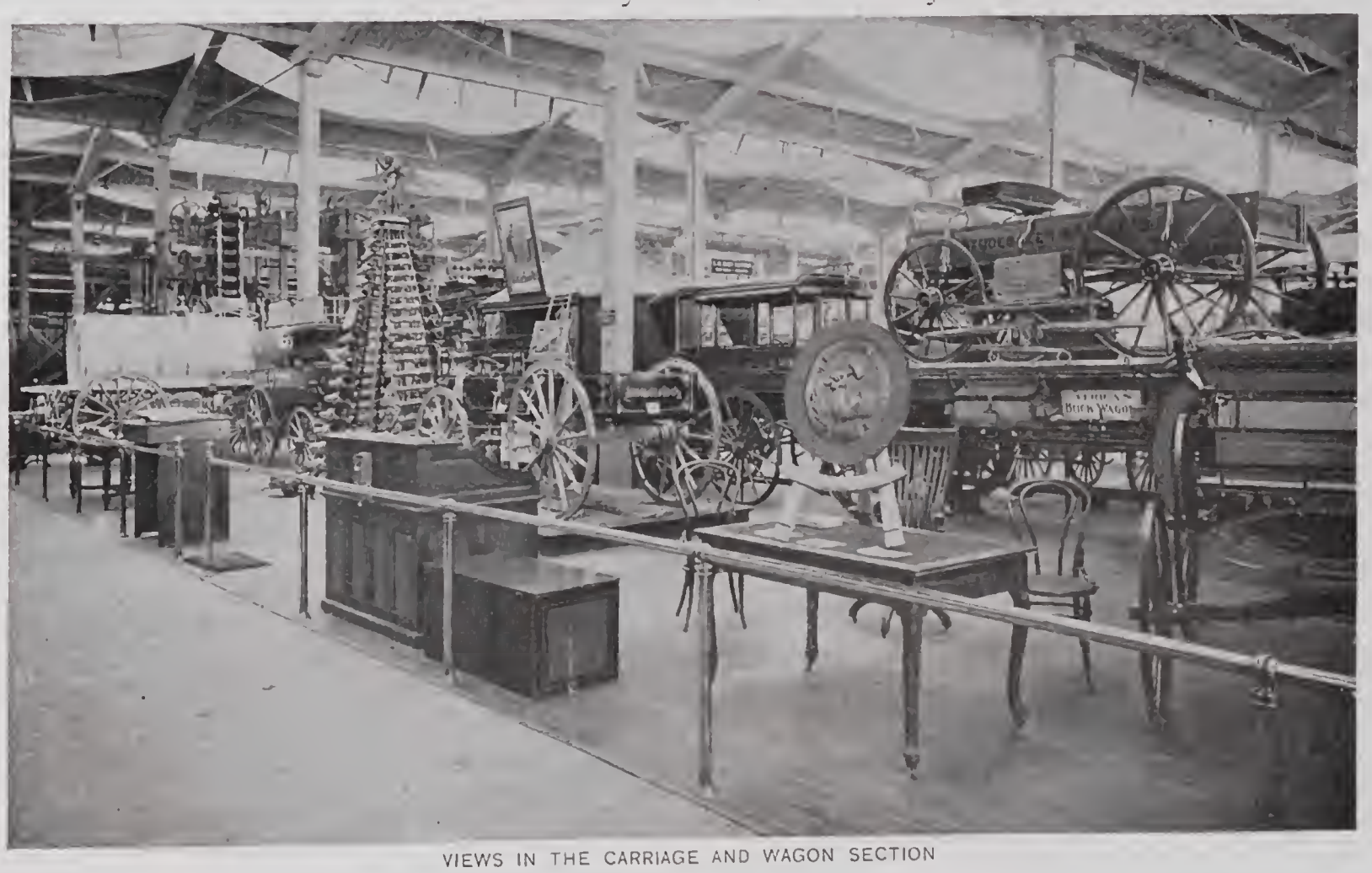
In the division of vehicles are included all the parts of which they are composed, and all appliances used for animals employed in travel and transportation, together with everything that tends to illustrate the development of this branch of locomotion from remote ages and from distant lands. First let us pass in review the collective exhibits of the United States and Great Britain, with the historical specimens scattered among their sections, for here is the largest and choicest assortment of materials, far exceeding in interest those of other participating nations.



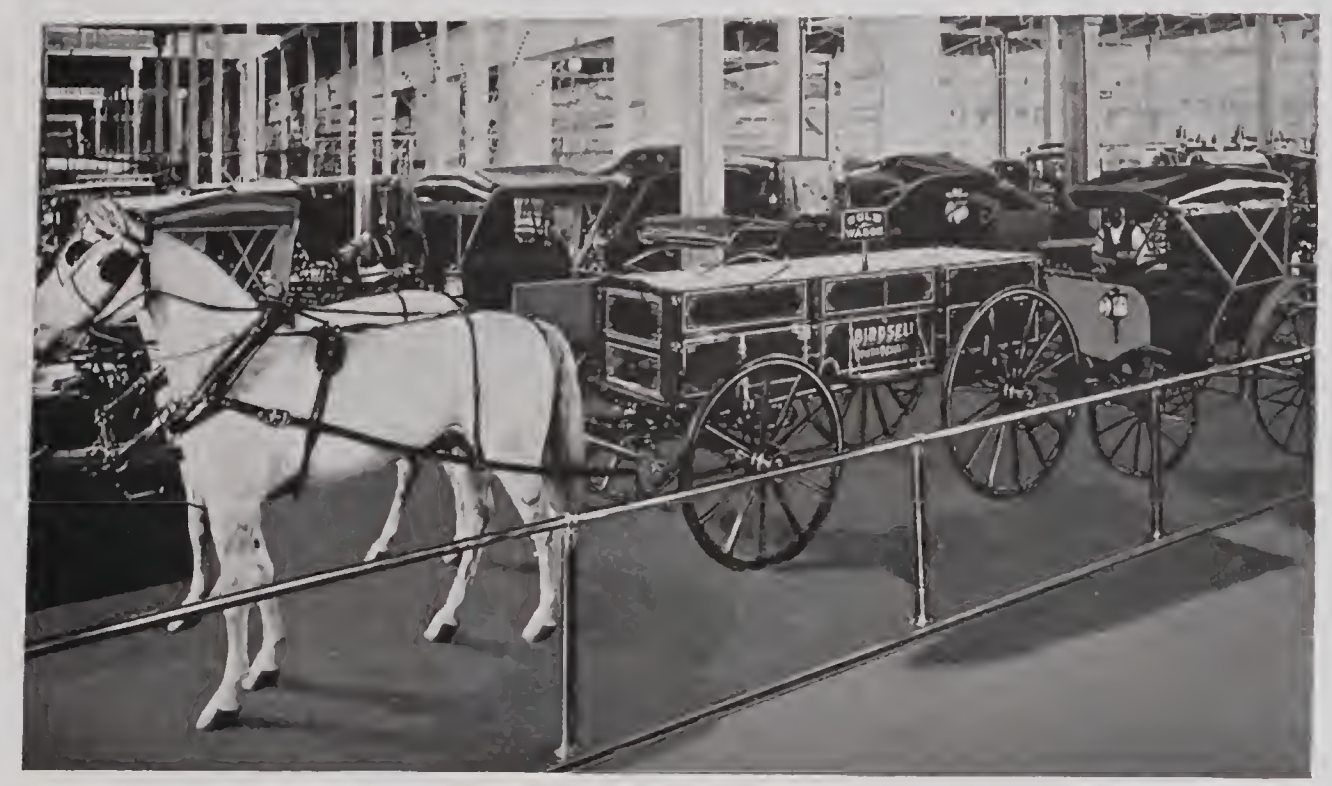
SAMPLE OF STREET SPRINKLER

Nearly three acres of floor space in the northern portions of the main building and annex are occupied by vehicles exhibited by manufacturers in the United States. Generally speaking, light pleasure carriages, as pony carts, surreys, phætons, rockaways, and coupés, with speeding wagons, sulkies, and trotting sleighs are found in the main hall, and in the annex are grouped the rougher and more cumbersome specimens, as trucks, farm and lumber wagons, street sprinklers, and such as are used by beer, coal, express, and ice companies. In the latter are also the delivery wagons of the grocer and dry-goods merchant, wheelbarrows, hand-carts, garbage and milk wagons, and various devices for dumping heavy loads.

In each of these sections, whose dividing lines are not distinctly drawn, are costly hearses, noticeable alike for artistic design and finished workmanship. A so-called state hearse, made by the Crane and Breed manufacturing company, of Cincinnati, and covered with figures of cherubim and seraphim, was designed by a woman, and is valued at $12,000. In another from the works of James Cunningham and son, of Rochester, is imitated the style of the Italian renaissance, with symmetrical dome, elaborately fashioned lamps, and body composed in part of bevelled glass, the highly polished portions relieved by those of more sombre finish. The same firm has also a



VIEWS IN THE CARRIAGE AND WAGON SECTION



A WAGON COLORED IN GOLD

Columbian coach, its body decorated in various colors, with trimmings of black, orange, satin, and gold lace. A New York manufacturer shows a sleigh in the form of a delicately tinted shell, resting upon a bed of sea-weed supported on the back of four dolphins. The front of the sleigh is in the form of a sea dragon, the coloring throughout being harmonious and artistic. Nearly a score of carriage manufacturers at Amesbury, Massachusetts, present a large and varied collective exhibit, including many styles of buggies, wagonettes, phætons, and rockaways, with a remarkably handsome specimen of a tally-ho coach. Studebaker brothers, whose factory is in South Bend, Indiana, and their salesrooms in Chicago, have an elaborate display, ranging from a light speeding wagon and a finely carved victoria to a massive four-in-hand. The Columbus Buggy company, of Ohio, also demonstrates the pleasing effects which may be produced by factory work, and adds to the interest of the entire exhibit by contributing to the museum of curios a typical Mexican ox-cart, its body and wheels made of huge timbers, and the state carriage of President Polk, built at Yorktown, New York, half a century ago.



WAGONS FOR THE CITY DEPARTMENT

A dozen or more of vehicles, of various nations and times, are ranged along the eastern and northern walls of the section now being described. First comes the Mexican litera, a kind of sedan chair, but with handles fastened to mules instead of to men, used for the conveyance of women over mountain roads. Next are the colonial carriage of 1760, and one of somewhat later date, used by a substantial citizen of Wilmington, Delaware, close to which is the pert, light sulky in which Nancy Hanks broke the world's record. In contrast with this feather-weight vehicle is the four-in-hand drag which flanks it, made by a London factory for the prince of Wales. Beyond is an antique Vermont sleigh of the last century, and a quaint wagon, more than 100 years old, in which rode Nancy Standish Wells, of Wetherell, Connecticut, a descendant of Captain Miles Standish. Almost touching the latter are the handles of a Japanese jinrikisha, and not far away the lumbering ox-cart of Mexico, the family coach of President Polk—its cushions falling to pieces and its veneering much the worse for wear—and the more modern carriage of Daniel Webster. In this vicinity also is the Spanish volante, with its single pair of cumbersome wheels, the horses driven neither tandem nor abreast, but in a fashion between the two.

Passing into the annex, where again the Studebaker company is represented, we find a large collection of farmers' wagons, especially from Wisconsin, Illinois, and Kentucky factories.



SPECIMEN PONY CART

Among other specimens of artistic workmanship is an ice wagon from a Philadelphia company, with historic scenes depicted on its panels, and a piano van from the same city, its body divided into diamond-shaped sections and painted in tasteful coloring.

On the ground floor is a small but choice display of British vehicles and their accessories, the main interest centring in the collections of two London firms. One of them has an assortmont of drags, victorias, mail-phætons, a rustic cart, and a canoe-shaped landau. In the state-coach used by the lord mayors of London, the other firm presents an attractive exhibit, as is shown by the crowds which surrounded it. The gold-fringed hammer cloth, the golden lamps, the body of blue bearing the royal crest, and the interior furnishings of heavy, blue damask, with trimmings of blue and gold, give to it the gorgeous and fantastic appearance which helps to make the lord mayor's show the laughing-stock of the British metropolis.



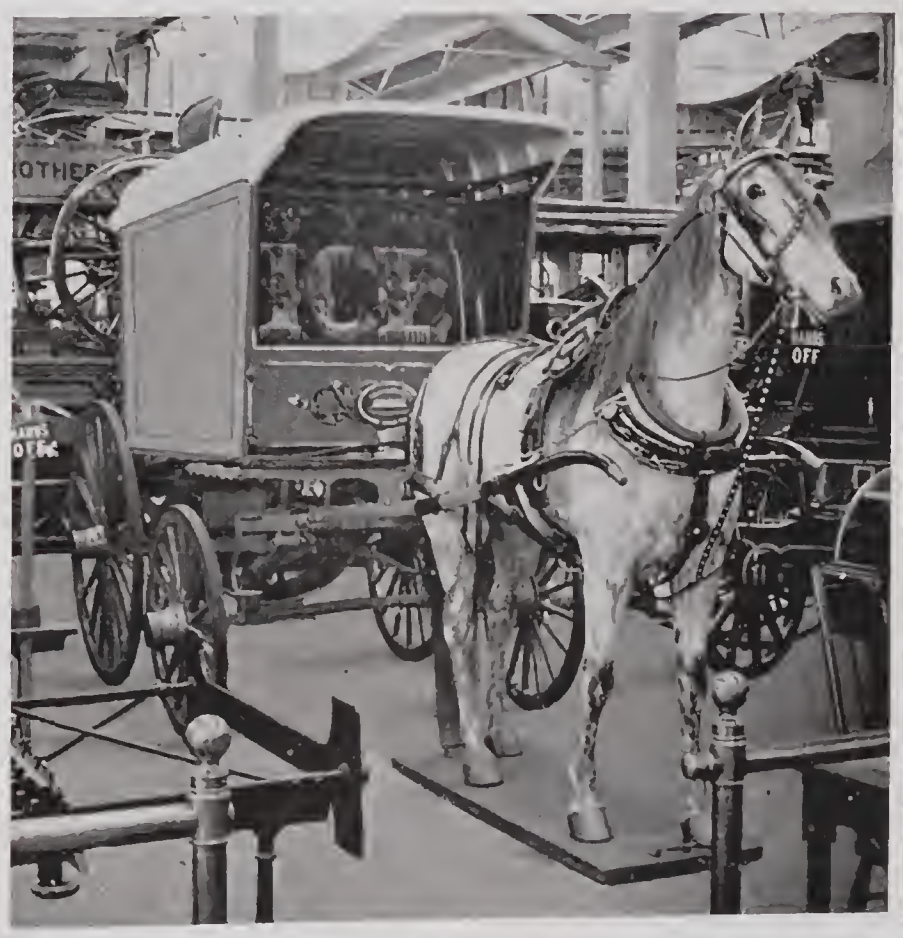
COLLARS OF ALL SIZES AND STYLES

Canada has but a slender exhibit of vehicles in her section north of the British display; yet one that includes nearly every description of conveyance used on land or stream, from heavy farm wagons to light carriages and phætons, with carriage springs and hardware, bicycles, skates, and sleighs in many styles. Of the last there is an interesting collection, as might be expected from a country where for three months in the year sleighs are almost the only means of travel and transportation. Among them is a model of the sleigh presented by the women of Canada to the duke of York and the princess May. It is a beautiful specimen of workmanship, showing the skill developed by long experience in this branch of manufacture. Here also are sportsmen's canoes, folding boats, snow-shoes, toboggans, and other special articles adapted to this home of the sportsman, with photographs of tourist routes and pleasure resorts.

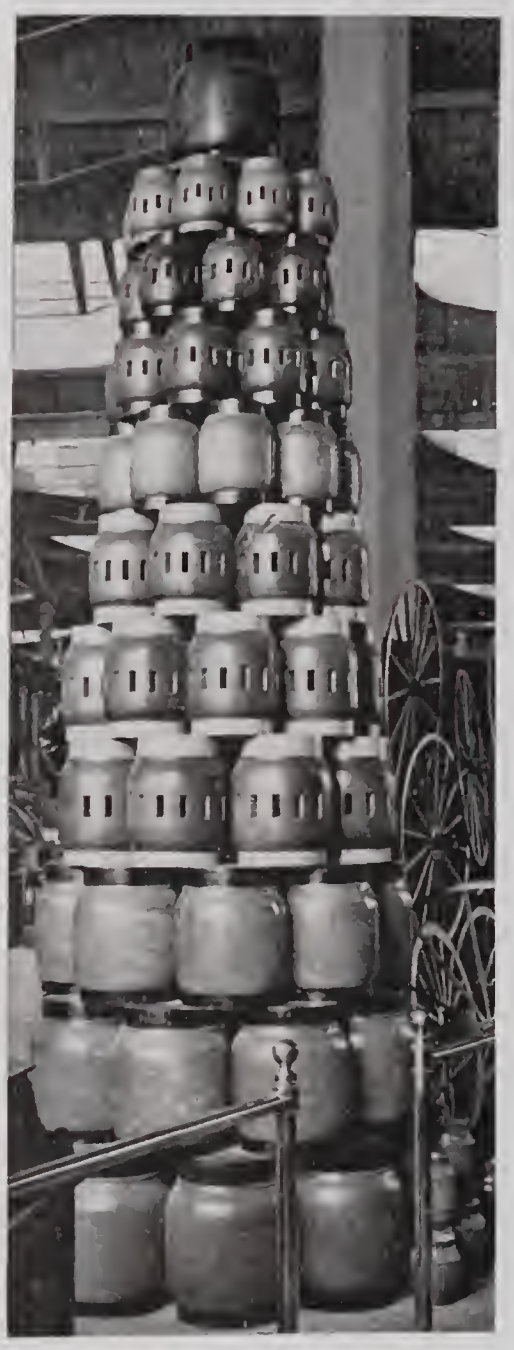


COLUMBIAN MILK WAGON

In the French section the Parisian manufacturers who are mainly represented have organized an exhibit remarkable for its variety of form and bright, artistic coloring. A double-decked omnibus, with massive enamelled iron guards around the steps, seems to combine comfort with safety, and near it is a $1,100 coupé of graceful outlines and richly but simply decorated, with an electrical indicator recording the distance travelled. Almost beside it is a gilded sedan chair of the seventeenth century, adorned with cupids, clusters of fruit, and garlands of flowers, while not far away are mail-phætons of unique design, landaus, dog-carts, road coaches, silver-mounted harness and saddles, with other paraphernalia, all tastefully arranged, a life-like dummy occasionally giving animation to the scene. There is also a small collection of bicycles, the remainder of the exhibit relating to the



LIGHT ICE WAGON



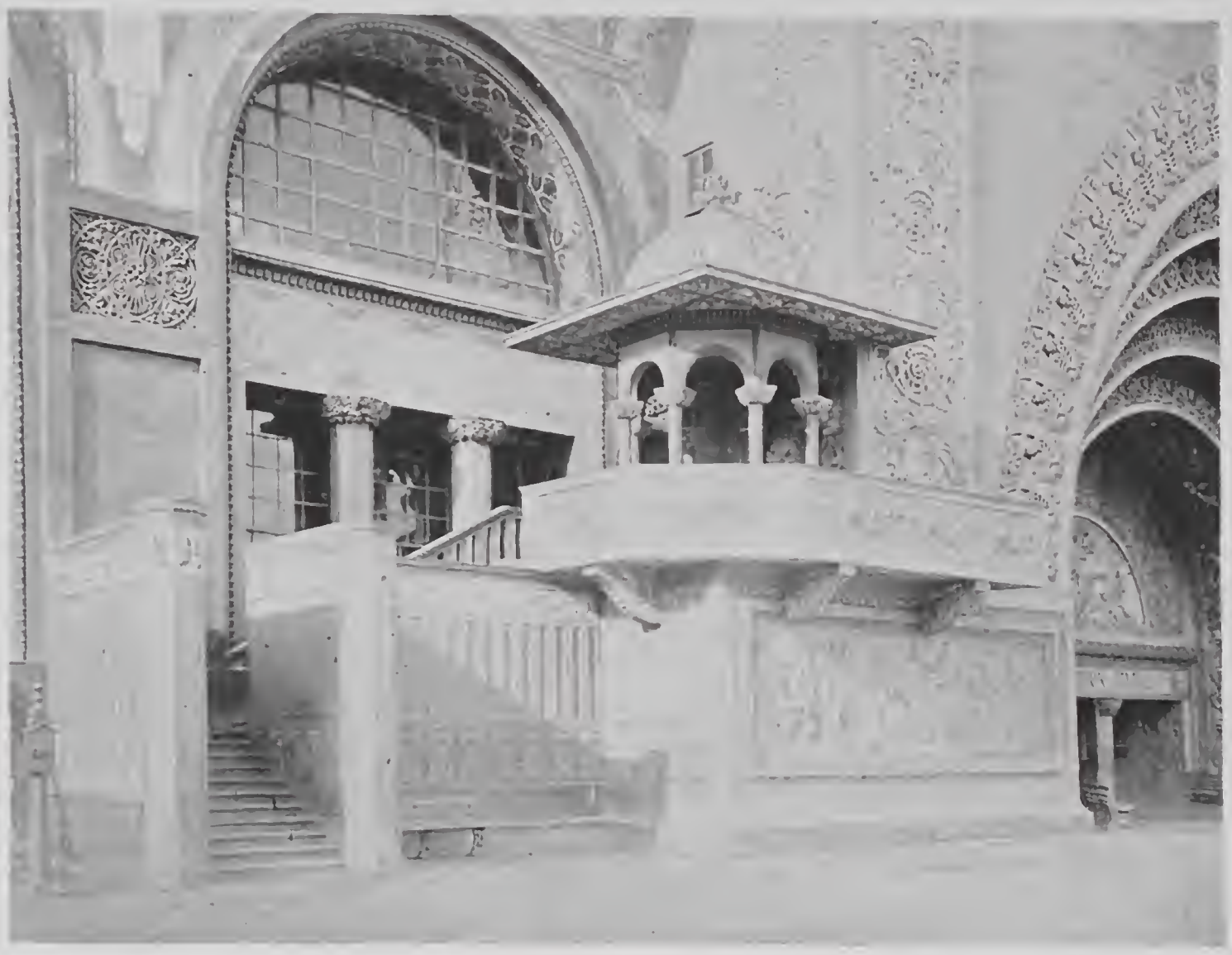
MONUMENT OF WAGON HUBS



MACHINERY HALL AS SEEN FROM THE OBELISK COURT

railroad systems of France already described in this chapter.

In the section devoted to vehicles Germany plays a modest part, her exhibit on the ground floor being confined to a small collection of bicycles and tricycles, a few carriages and wagons, registers for public cabs which record either time or distance travelled, and a carriage whose motive power is gas. Italy is but slightly represented in the Transportation department, her entire display consisting of a collection of cordage and whips, and a refrigerator car from a Milanese firm.



OUTER SECTION OF TRANSPORTATION BUILDING

Droskies and sleighs of artistic design and elaborate finish, heavy robes, muffled outriders and drivers, are what the visitor expects to see in the Russian section; nor is he disappointed. Among the finest specimens is a large sleigh with rich ebony finish, the runners curving gracefully in front and the driver further protected from contact with his horses by a rampant figure of the king of beasts. This exhibit is by a Moscow firm, and another manufacturer from the same city displays the saddles and harness which have gained for him during the past forty years medals of bronze, silver and gold from the fairs of his own municipality and those of Philadelphia and New Orleans.

A structure of mediæval aspect now attracts the attention of the visitor, one that appears somewhat out of place in the Transportation building. Around it are patches of verdure, and a large mosaic of Columbus, set into the wall near the main entrance, adds to the incongruity of the exhibit. The Gothic arch which forms the doorway is approached by a short stair-case, and beyond, and within is the inscription, "The United Tyrolean Association for the attraction and guidance of tourists." This edifice is, in fact, a reproduction of a Tyrolean monastery of the middle ages, the figure of Columbus being the handiwork of native peasantry, who used in its construction pieces of opaque glass colored by burning. The alpine panorama presented to the visitor as he ascends the stairway is supposed to be viewed from the vestibule of the monastery. The canvas shows the grandeur of the Mittelberg glacier, and also the signs which direct the traveller to noted resorts scattered throughout that region. Two small apartments at the side of the panorama further impart a religious aspect to the structure, containing as they do carved and painted figures of sacred personages, photographs of churches, and burnt etchings in wood in imitation of Raphael's work. Small alcoves are filled with articles made by the peasantry of the Tyrolean alps, including native costumes, and affording a gentle hint as to the real object of the exhibit are samples of the clothing best adapted to tourists whose path lies through these regions.



CARRIAGE OF EX-PRESIDENT POLK

On one side of a screen in the Japanese section adjacent is a series of photographs depicturing oriental modes of transportation. A leading rôle is played by the shah of Persia, with his state carriages and gorgeous retinue. Opposite is a small space crowded with figures whose originals are found among the street carriers of Constantinople, this statement, however, not applying to the Turk, apparently bending double under the weight of a vast packing box consigned—so reads the custom house label—to the Columbian Exposition. The burdens



FISHERIES AND FOREIGN BUILDINGS FROM A DISTANCE

BIRDS-EYE VIEW OF GROUNDS

borne by the donkeys, the sedan carrier with his lady, the peddler with market basket on his back and tray of tins before him, and other typical characters, are more in keeping with the environment. Packs and harness for man and beast, with trappings and appliances of various kinds, are also within the scope of the exhibit.

In the Brazilian section, the old and new, the savage and civilized are strangely commingled, and the contrasts are rendered all the more striking from juxtaposition within a somewhat contracted area. Along one entire side is a canoe, more than fifty feet in length, fashioned from a large mahogany tree. A few feet away are a first-class passenger coach for local travel, and a roomy tramway car from Rio de Janeiro, with finely finished wood-work and reversible seats. Near an antique tricycle of the year 1850, the first one seen in Brazil, is the state carriage used by Dom Pedro in 1822. From the naval department of the republic are the great yards and docks at Rio, with models of engines, hoisting and other apparatus there employed. In a gaudy Turkish carriage, between the exhibits of Brazil and Mexico, is one of the many instances where the most diverse of civilizations touch elbows in the Columbian Exposition.



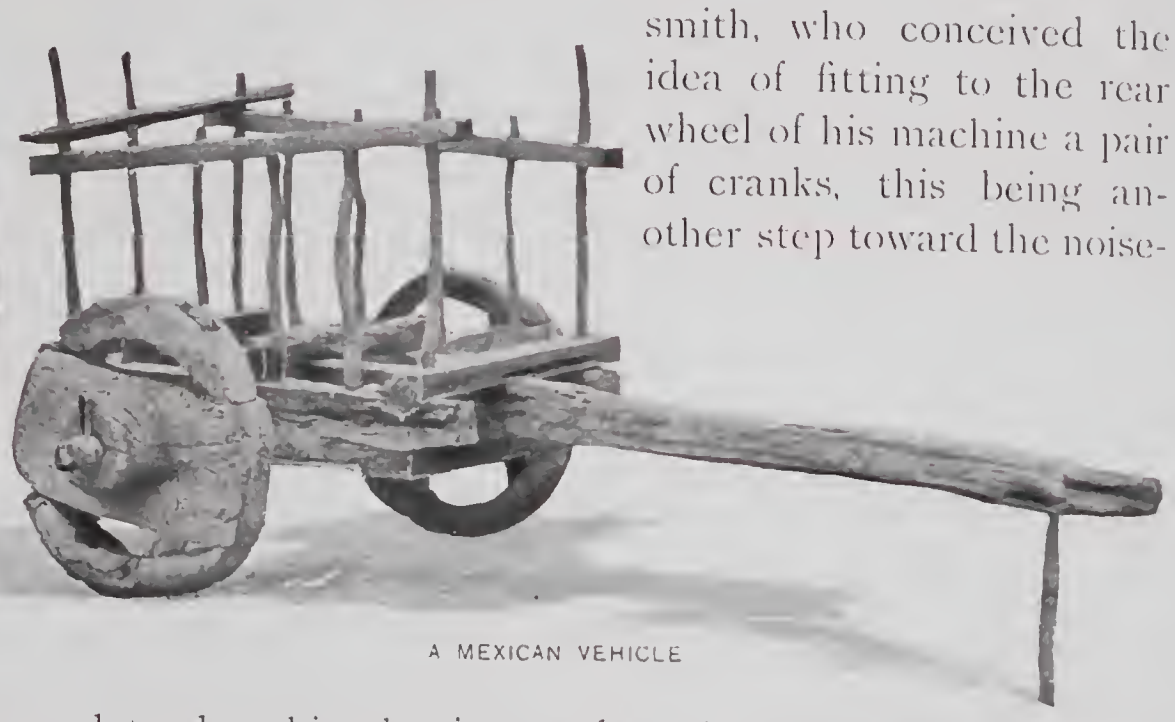
CART FROM SURAT, BOMBAY

In the northern half of the gallery floor is a large assortment of bicycles and miscellaneous exhibits, and these I will describe beginning with the collection of Great Britain, which has here installed the greater part of an extensive display of vehicles. On a ledge of the gallery, in the midst of a museum of curios presently to be mentioned, stands an odd looking machine with wheels joined to a wooden backbone and handle. Upon it is a saddle, but the observer cannot detect the mechanism by which it was propelled, until in one of the quaint pictures which line

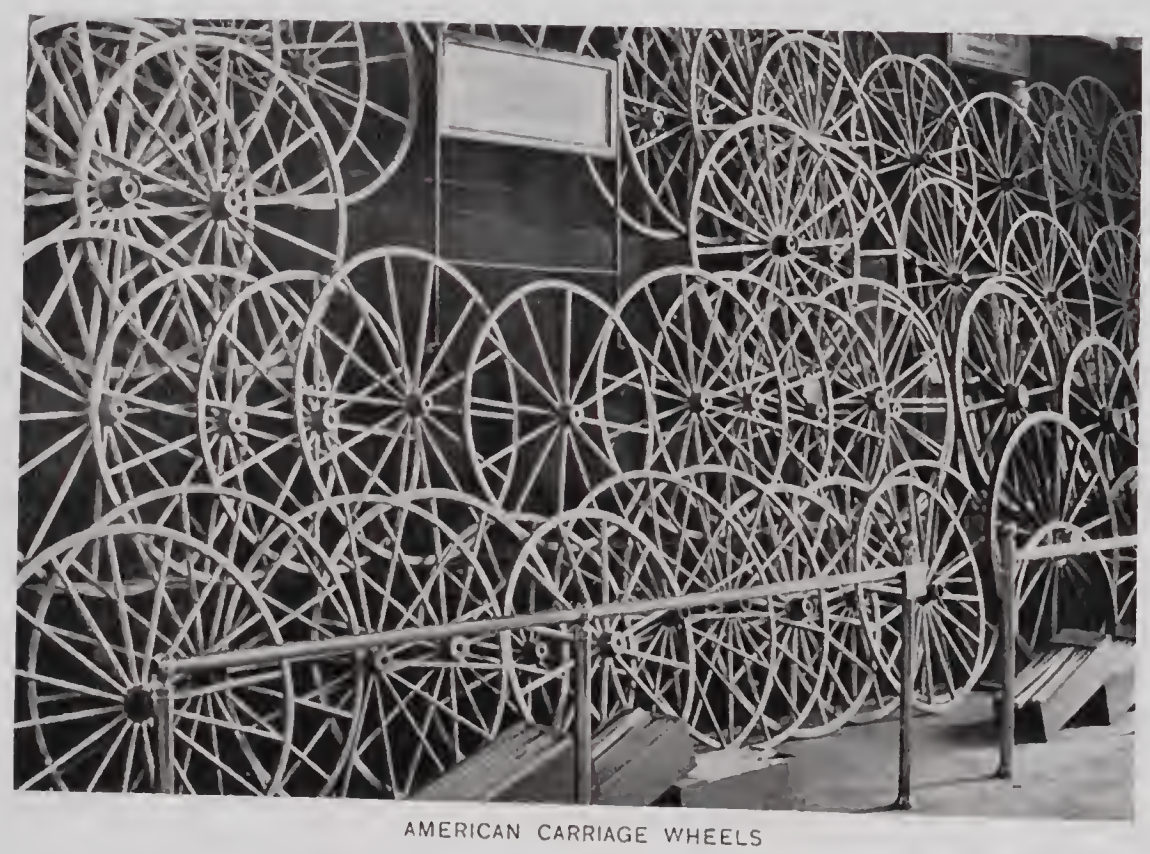
the walls he sees its counterpart. Astride of the latter is depictured, with his feet vigorously pawing the ground, the rider of the English hobby-horse, which, during its brief existence in the early portion of the present century, was mercilessly caricatured by the press. The specimen here presented is said to have been ridden by the first earl of Dunham in 1810. But aside from its comical appearance, this vehicle is of interest as the forerunner of the modern bicycle. Among those who mounted the dandy horse, otherwise called the pedestrian curricle, was a Scotch blacksmith, who conceived the idea of fitting to the rear wheel of his machine a pair of cranks, this being another step toward the noiseless swift-moving machine of the present day. Tricyles and tandem bicycles it may here be observed, have never come into such general use as the trim, light, two-wheeled machine known as the safety—safe as compared with the high-wheeled pattern, and now furnished with pneumatic tires and trimmings of aluminium which help to reduce the weight.



DANIEL WEBSTER'S COACH



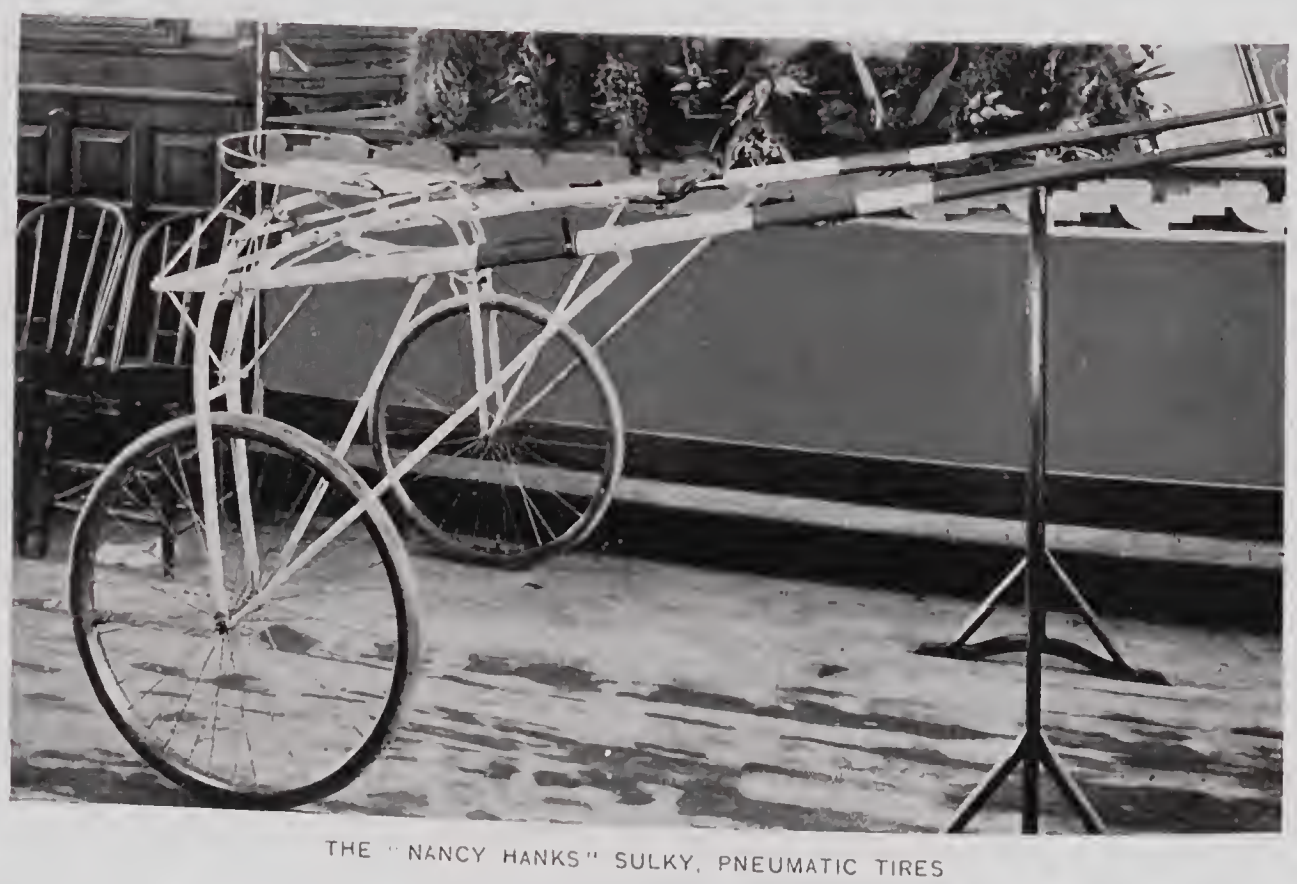
A MEXICAN VEHICLE



AMERICAN CARRIAGE WHEELS

The British collection consists mainly of the bicycles best adapted to the excellent roads for which that country is famous. Here and there are a few tricycles, and several firms display such specialties as cold-drawn steel tubings, tires of peculiar make, and other parts of the machine; but as a rule the score of manufacturers who have organized this department confine themselves to the modern bicycle in its entirety. A Coventry firm has on exhibition more than thirty specimens of safeties alone, some weighing only 18 and none more than 30 pounds, the finer grades furnished with the twisted tubing which is only used in their construction. A Birmingham company has a large assortment installed in a richly furnished section, finished in mahogany with a neat office in the centre. Its standard machine weighs 37 pounds, the racer being only about half as heavy, and as one of its specialties is shown a bicycle for women. In the section containing a Nottingham made machine is a large case filled with medals, cups, and other prizes won by its rider, now generally recognized as the world's champion. The company also furnishes a record for 1892 of 100 notable races in which the machine and rider participated, the contests being held in Great Britain, Germany, Canada, and the United States.

On the southern wall adjacent to the French section, the institute of British Carriage Manufactures has an interesting collection of paintings, drawings, and engravings illustrative of the gradual changes wrought in the construction of vehicles. In some of them are depicted stage-coach and other modes of travel; in others, the jeering crowds which greeted the first steam carriages, as these crude mechanisms halted midway on a steep hill, or were imbedded in the mire. Convivial coaching parties are gliding swiftly



THE "NANCY HANKS" SULKY, PNEUMATIC TIRES

along green-hedged English roads, and in another series are shown the start, the mishaps, and the conclusion of the first recorded steeplechase. Caricatures are plentiful, both of Irish and English travel, and in hundreds of drawings, here and along the front sections of the gallery, are displayed in outline the construction of state coaches and foreign vehicles, with the heraldic devices placed upon them. Here is an early Spanish coach, there a French carette, and a few feet away the lord-mayor's carriage of 1757, and the magnificent car of state in which rode Louis XIV. Among the members of the institute who have contributed to this collection are Hooper and company, carriage builders to the queen and to the prince of Wales, and the Coach-makers' company, of London, among the rare drawings furnished by the latter being one of the state-coach said to have been used by John V of Portugal, in 1706.



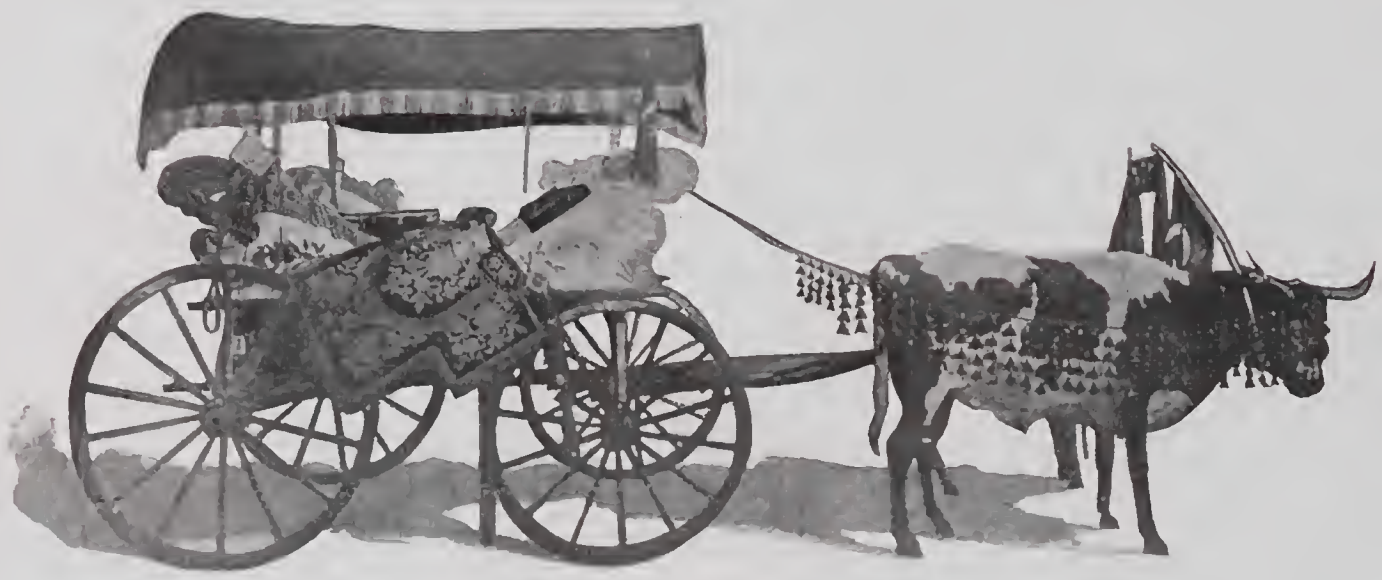
AUTOMATIC FIGURES IN MOTION

Among the groups of curios arranged along the front of the gallery is an array of cruel looking spurs, with massive specimens in brass and silver dating from the seventeenth century, and an antique war bit champed by the mailed-steed of a crusader of the middle ages.

In the British section also transportation by sea and land is illustrated by a collection of models from the government of Ceylon, where the visitor may observe the difference in the construction of the bullock-cart used on low marshy ground and the one adapted to the highlands; or he may see in miniature a carrying chair, a gravel wagon, and a racing cart. Models of boats there are whose outlines are somewhat unfamiliar, especially the catamarans and the outrigger canoes. The latter carry enormous sails, and it is said that the winds that ruffle Ceylonese waters are known as one-man, two-man, and three-man breezes, according to the number of men required to perch on the outriggers in order to keep the craft from capsizing. The double canoes, or fishing boats, the originals of which are made of del wood, closely resemble ice boats. A group of apparatus characteristic of the Holy Land, a contribution from the United States consul at Jerusalem, is composed of



DISPLAY OF A CHICAGO COMPANY



A TURKISH CONVEYANCE

leather bottles, water-skins, mule-packs, jars, bags for carrying babies, and baskets for holding horse feed. Near the model of a boat, such as has been used for centuries upon the sea of Galilee, is a small wooden frame propelled by children while learning to walk.

North of the British gallery section, the Japanese department of communications has an exhibit supplementary to that of its hydrographic and naval bureaus, presently to be described. Here are maps portraying the principal routes of coasting steamers and charts indicating the monthly average of wrecks in given sections, together with the location of light-houses. There are also traced the railway systems of the country; and statistics are plentiful as to the extent of their interests and these of the merchant marine. There are numerous models, from those of the ubiquitous mule which appears to be the common carrier of mankind to the passes of the Usui mountains, showing the Abt railway system and the great bridges over the rivers Kurobe and Nishiki. Additions have been made to the original bridges completed in the 17th century, but the portions built

mounted milk-woman, and also the native carrier of the Andes with a traveller's chair strapped securely to his back.

At the gateway to the bicycle and marine exhibits of the United States, the island of Madeira furnishes a unique contribution. First there is a large coach curtained, roofed, and travelling on runners on streets so slippery that wheels would be of no avail. Upon a rear seat the driver urges on the bullocks which drag this odd-looking conveyance over the paved highway. Here also is shown the mountain sleigh, upholstered in red, which slips down the precipitous and well travelled heights with the velocity of a locomotive. Another means of conveyance here reproduced is a mountain hammock, resembling a sedan, which, attached to poles, is carried with its human freight among the mountain peaks of Madeira.

Not far away is a small museum in which are represented ancient types of vehicles. Here is a reproduction of a racing chariot exhumed from a Theban burial ground, and of which the original, in the royal



GENERAL VIEW OF THE EXPOSITION GROUNDS



FROM A POINT NEAR THE WOMAN'S BUILDING

in that era are still considered remarkable feats of engineering. The structure thrown over the Kurobe, called the Aimoto bridge, is of the cantilever pattern, with a span of more than 160 feet.

North of the Japanese section, and occupying the entire northern aisle, is a large collection of miscellaneous exhibits, as saddles, bridles, and harness: wagon, carriage, and saddlery hardware; carriage lamps, axles, and springs; collars, chains, halters, and blankets, wheels, and hubs; rubber steps, dashes, and fenders; boots for liverymen and leather overalls for cowboys. Some of the groups consist entirely of whips, as that of a Chicago company which manufactures at the rate of 10,000,000 a year. The monotony of these exhibits is somewhat relieved by the groups on either side of the northern entresol, one of them in the form of a saddle, harness, and cart from Palermo, Sicily, the trappings decorated in the highest style of Sicilian art and bedecked with ribbons presenting all the hues of the rainbow. The saddle is surmounted by a red plume and the collar band studded with small glass mirrors. Of the cart itself, every square inch of its body is brightly painted with figures, the spokes, hubs, and felloes with alternate stripes of red and blue. It is a national conveyance, used either for the carriage of commodities or for the conveyance of visitors to local fairs and wedding feasts.

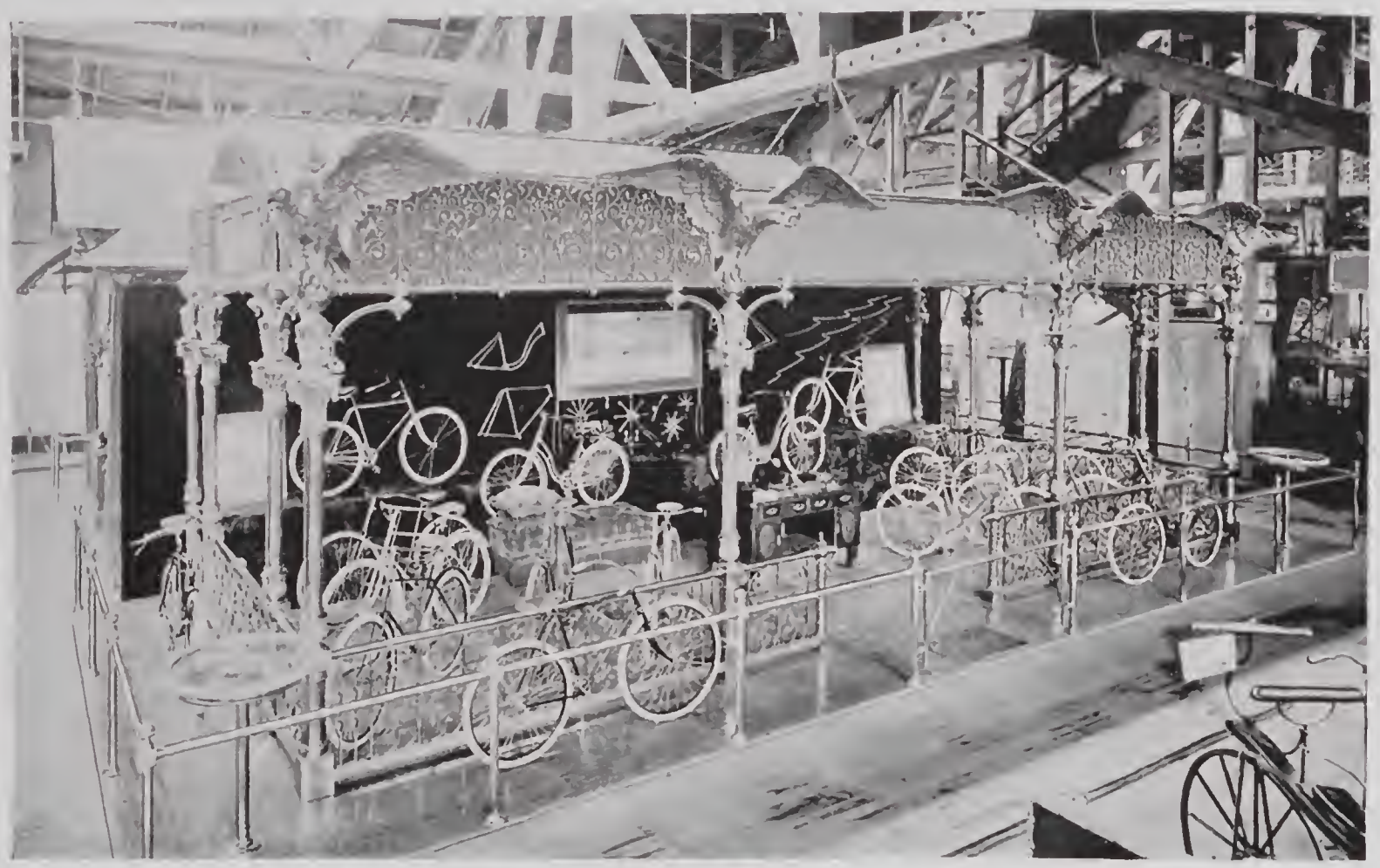
At the opposite end of the northern gallery are photographs and models illustrating the modes of transportation prevailing in South America, their subjects ranging from railway stations and railroad scenery to brute and human pack carriers. Among them are the llama and his burden, the mule driver of Colombia, the

museum of Florence, is probably the only vehicle that has survived the pre-Christian era. Beside it is an unwieldy ox-cart, such as was used by the Pueblos of New Mexico. In the cases which partially surround this exhibit are some of the oldest railroad tickets and announcements issued in the United States, with similar contributions from the railways of Japan.

In the United States exhibit of bicycles, more than forty of the leading manufacturers participate. The display is organized almost on the same plan as that of Great Britain, some of the exhibitors showing special parts of the machine, but the majority presenting the entire mechanism. Many of the collections are housed in handsome pavilions, and not a few are in charge of well-known experts who have won for themselves a wide record while using the machines whose numerous merits they explain so graphically to the interested visitor.

Chicago is well represented in this section, several of the larger factories making a somewhat elaborate display. The Western Wheel works have, in addition to bicycles of many patterns, wheel chairs and children's carriages, all very tastefully arranged in their neat and spacious pavilion. In the specimens prepared for exposition, the Stokes Manufacturing company has avoided the use of enamel nickel plate that the visitor may better judge for himself as to their material and workmanship. The Gendron Wheel company, of Toledo, has one of the largest collections on exposition, including bicycles, tricycles,

velocipedes, children's carriages and sulkies. In a structure composed of brass, a Boston company shows in several styles its bicycles with weldless steel tubing. Beside the perfected machine of 1893 are the parts of which they are composed, either as unwrought material or in various stages of manufacture. There is also a model of the English dandy horse, with the first bicycle worked with pedals, of Parisian make, the first safety, which appeared in 1877 in Boston streets, and the now antiquated machine on which Stevens made his tour of the world. Finally there is a bicycle fashioned for military service, one that has recently been adopted by the army department.



DISPLAY OF BICYCLES

Other features in this division are wooden bicycles from a Newton company of Massachusetts. An exhibiting firm, dissatisfied with its space and position, placed two of its machines upon the gallery railing, the treadles automatically worked by a youth and maiden. A group finished in rainbow tints is among the many ornamental specimens contained in the department.

About midway in the eastern gallery, near the southern end of the bicycle exhibit, are the tent and palanquin in which Mrs French-Sheldon lived and travelled during her journey of 1,000 miles into the heart of the dark continent, attended only by her retinue of Africans. The palanquin is built of bamboo and aluminum, and contains a bed, an adjustable table, and lockers for wardrobe and toilet articles. Around it is reproduced the scant herbage of the desert; here also are the boxes in which Mrs Sheldon stored her supplies and her presents for native tribes.



ORNATE RUSSIAN SLEIGH

In the marine division of the Transportation department the most interesting exhibits are the Columbian caravels and the Viking ship of the Norsemen, reproduced as nearly as possible in fac-simile, just as they sailed the seas many centuries ago. After crossing the Atlantic and taking part, as I have said, in the naval review in New York harbor, early in June the caravels arrived, by way of the lakes, off Jackson park, where, as at every port of call, they were received with welcome and ovation. With her four



MRS FRENCH-SHELDON.S PALANQUIN



COACH OF THE LORD-MAYOR OF LONDON

decks, her breast-high bulwarks, her poop some twenty feet above water line, and masts and rigging too heavy for her size, the *Santa Maria* is an ungainly looking craft, one that, without the aid of steam tugs, it would have been impossible to handle on her 9,000 miles of ocean, lake, and river navigation. Of the three craft, this is the only one fitted and furnished throughout to resemble the original type, so far as could be reproduced an obsolete style of naval architecture and equipment. Suspended over the main hatchway is a long-boat



THE VIKING SHIP MOORED NEAR THE "ILLINOIS"

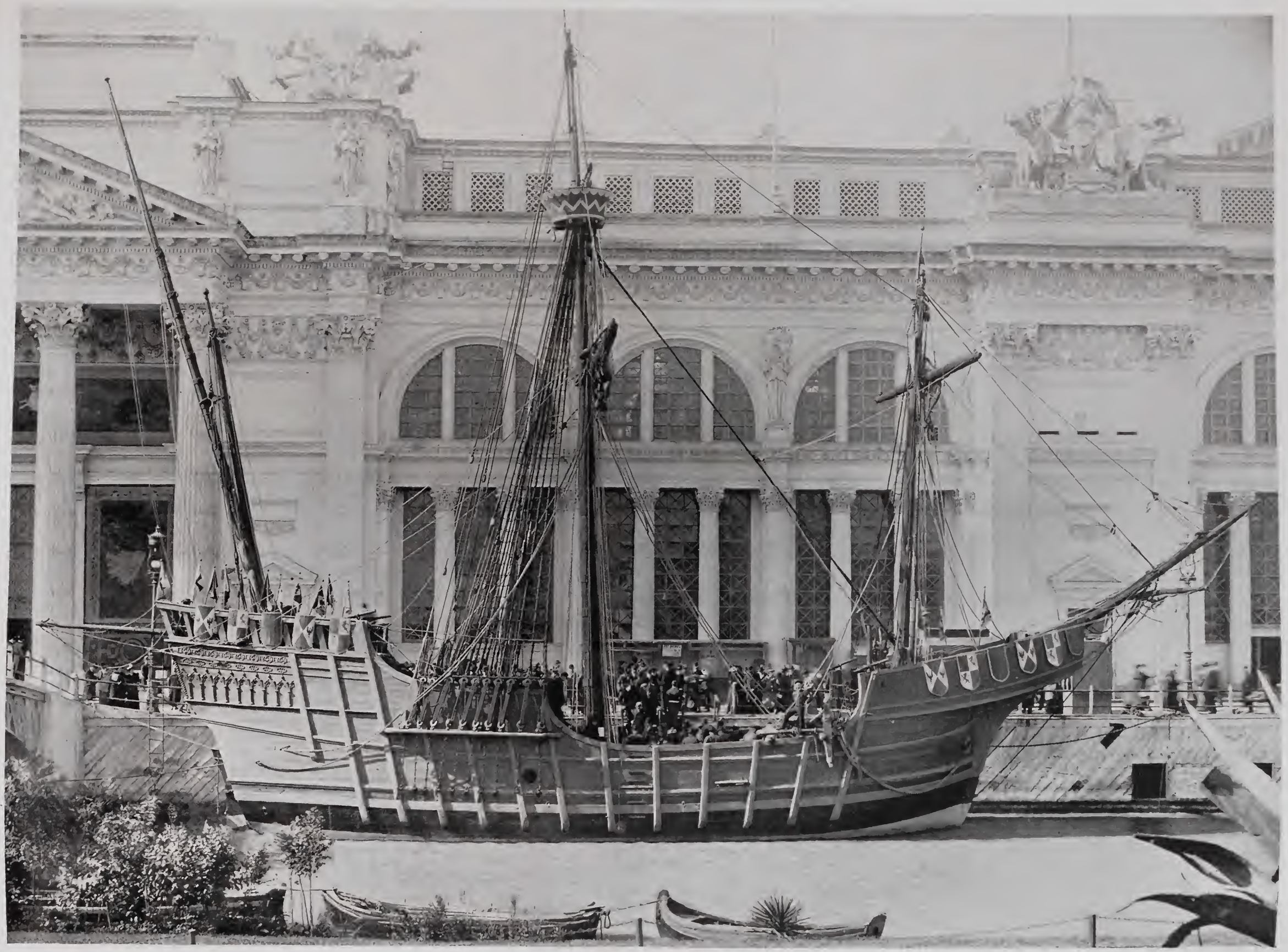
similar to that which the vessel carried, the only one on board. Coiled around the deck are ropes of curious pattern, and the hawsers, nearly half a foot in diameter, are strong enough to hold a first-class man-of-war. There are no capstans, sails and anchors being worked with ropes hauled by main strength. Aft of the ship is the admiral's cabin, with its cramped quarters suggestive of bodily discomfort, its narrow bedstead covered with a counterpane of red damask bordered with lace. Here are numerous relics, including, as is said, the table which Columbus used; his chart, his inkstand, and the nautical instruments of the day; with the flag presented by Ferdinand and Isabella, its white field with cross of green, and on either side the initials of their catholic majesties.



FROM THE HOLY LAND

The *Pinta* is similar in shape to the *Santa Maria*, though of smaller dimensions, and the *Nina*, with her leg-of-mutton sails, is little better than a row-boat, not larger in size than the bireme of the Greeks. But as to these vessels no further details need here be added to the hundreds of descriptions published in the current literature of the day. All the three craft were presented to the government of the United States, and at the close of the Exposition would be cared for by the naval department.

Of the *Viking* ship, resembling the vessel in which,



THE CARAVEL SANTA MARIA



as is claimed, a Norwegian navigator discovered the North American continent nearly a thousand years ago, the following is briefly the story. During the winter of 1879 a sailor, living at the port of Sandefjord, employed his spare time in exploring a mound on the outskirts of the town, where, as tradition related, a Viking had been buried with all his earthly belongings. In this ancient Saga legend the towns-folk had little faith; but the sailor persisted, and after digging a square hole not many feet in depth, his spade struck a solid oak plank, which proved to be the side of a ship. Thereupon the royal university of Christiania sent men to inspect the relic, and in early summer, when the frozen earth could be cleared away, it was found to be the genuine craft of "a Viking old," whose skeleton, encased in armor, still kept guard over his treasure, its wood-work, oars, and equipments all well preserved after the lapse of many ages.

The vessel was repaired and removed to the university, where now is its home, and as the approaching Columbian Exposition began to be the talk of the world, it was determined to send there her counterpart, manned by Norwegian sailors and unattended by any other craft, in order to prove the feasibility of Leif Erikson's alleged expedition, more than nine centuries ago, from Norway to the New England coast. Thus from Sandefjord the vessel built by public subscription, in the spring of 1893 set sail for New York, and in the middle of July anchored off Jackson park. To call her a ship is somewhat of a misnomer, for she has no deck, and carries but little sail. Rather is she a large open boat of some 27 tons, more than 70 feet long and 16 in the beam, with 32 oars, each 17 feet in length, her bow and stern far above her body and her clinker-built planks overlapping like the weather-boarding of a house. Her lines are remarkably beautiful, resembling those of a yacht, the convex curvature of the keel increasing her strength and steadiness of motion. Such is the vessel in which a crew of Norwegian sailors crossed the Atlantic and the lakes, sleeping on reindeer skins and cooking their food as best they could in the bow of their unsheltered craft.

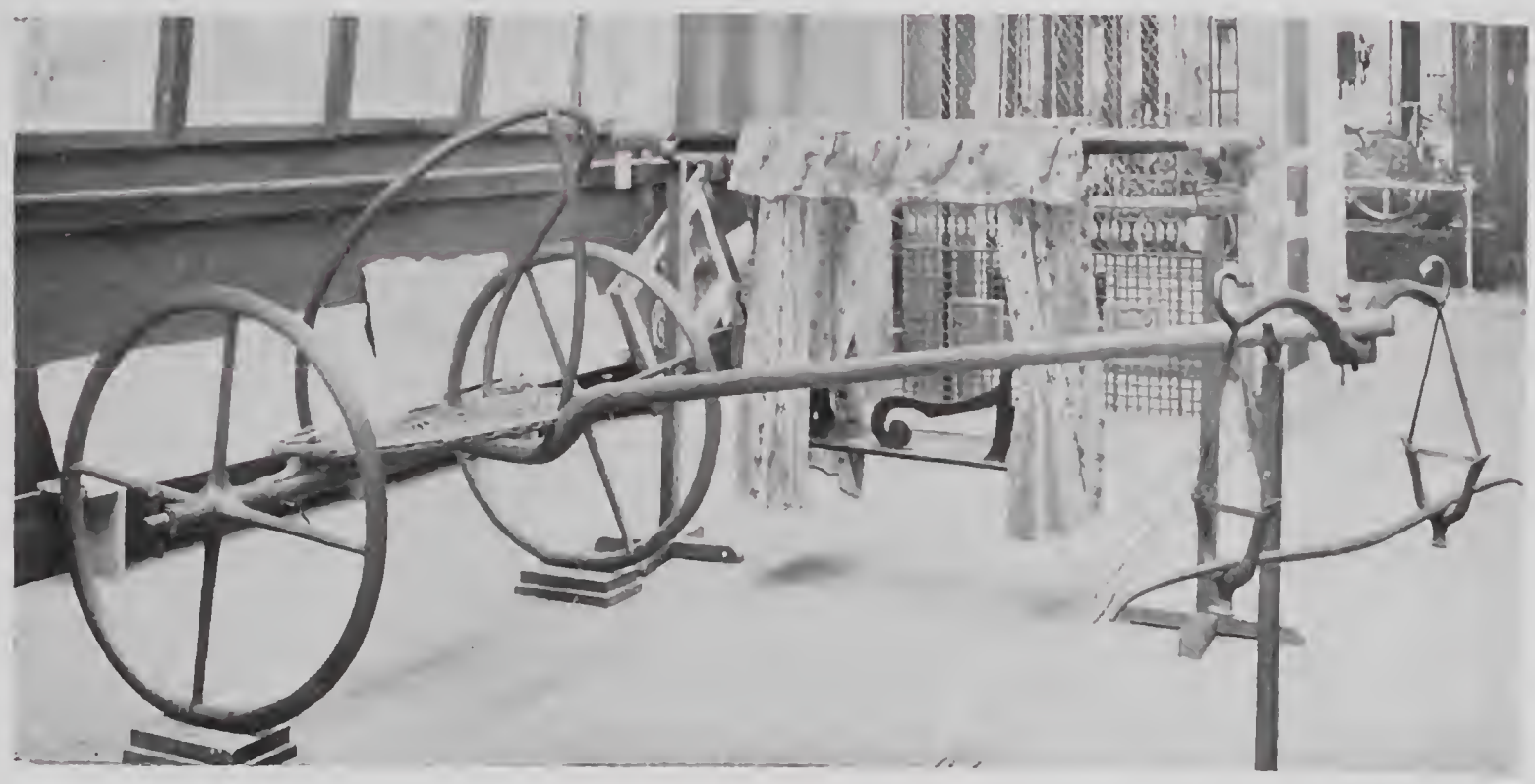


GRACE DARLING

Reëntering the Transportation building through the golden doorway, the first object to attract attention is a beautiful model of the *Santa Maria*, loaned by the city of Genoa. Beyond this is a broad beamed, battered, old-fashioned craft, with but the faintest traces of paint, one that was certainly not placed here for ornament, and of which the following placard explains its presence: "In this boat, on the morning of September 6, 1838, Grace Darling, then 22 years of age, with her father, rescued nine people from the wreck of the *Forfarshire*, at Longstone, on the Farne Islands." There is no self-righting or other of our modern apparatus wherewith to do battle against winds and waves — nothing but sound timbers, sturdy arms and the courage which wrought one of the most heroic deeds that history records.

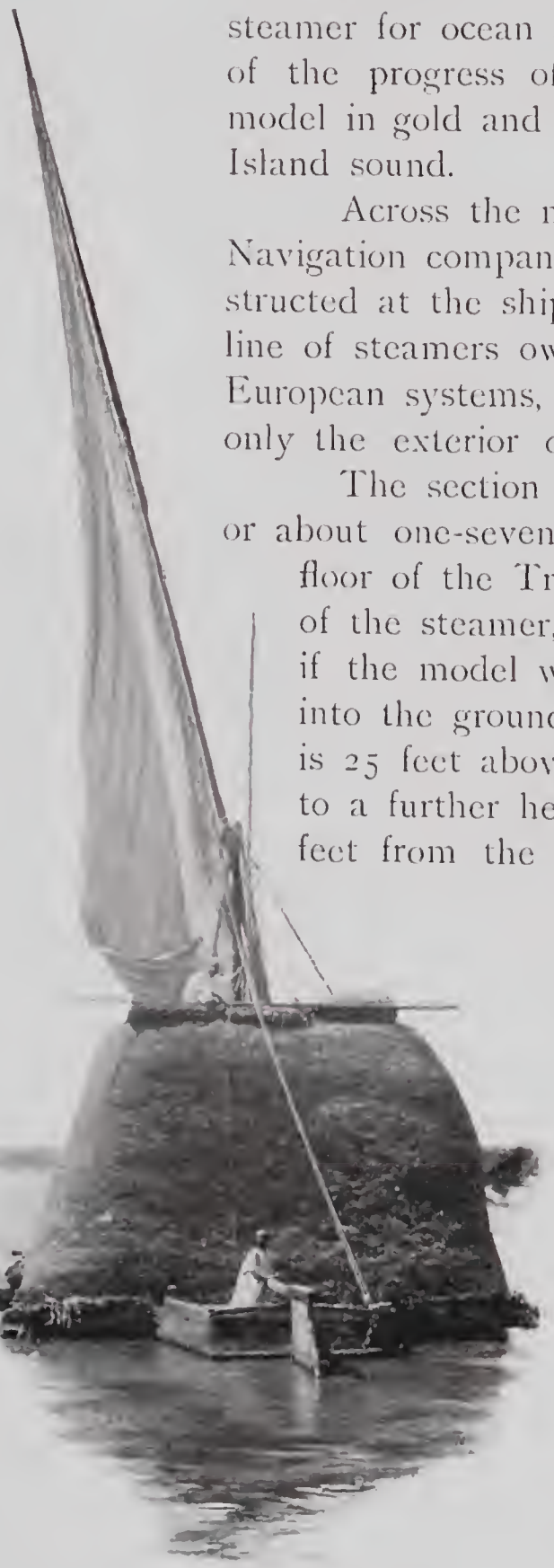
Turning to the marine exhibits of the United States, we find only a small portion of them on the main floor, adjacent to the German section. Here are life-preservers and life-boats, pleasure boats, launches operated

by steam, gas, naphtha, and gasoline, and in the midst of all a caique which has seen service on the Bosphorus and the Golden horn. Of modern pleasure boats there is a fine collection from Thomas Kane and company, builders of the electric launches which ply on the waterways of Jackson park. In this vicinity are many other specimens of small, light craft, with marine hardware, ships' anchors, steering, hoisting, and other nautical apparatus. There are also models of well-known steamships, the most complete exhibit of this character being that of the Harlan and Hollingsworth company, of Wilmington, Delaware, whose progress in marine construction is exemplified in a gallery of pictures and models of the schooners, yachts, tugs, ferry boats, steamers, and propellers built at its works during more than half a century. Altogether more than 300 vessels have been constructed, including, as is claimed, the fastest steamboat in the United States, the first iron screw steamer for inland service, the first iron steam pilot boat, the second largest transfer steamer in the world, and the first iron steamer for ocean service, completed in 1844, these and others forming a chronological panorama of the progress of ship-building in the United States. In this pavilion is also a working model in gold and silver of the machinery in one of the company's iron steamers running on Long Island sound.



ANCIENT WAR CHARIOT OF SCYTHIA

Across the main aisle near the southern entrance-way, is the exhibit of the International Navigation company of Philadelphia, consisting of a full-sized section of a steamer now being constructed at the ship-building yards of William Cramp and sons. As this is the only transatlantic line of steamers owned in the United States that will bear comparison with the Cunard and other European systems, the display is of special interest to American travellers; for here is shown not only the exterior of the vessel but all its internal arrangements, furnishings, and equipments.



AN EGYPTIAN HAY BOAT

The section is more than 70 feet long by 35 in width, or about one-seventh of the entire length of the ship. The floor of the Transportation hall represents the water line of the steamer, which is 26 feet above the keel, so that, if the model were complete, it must sink that distance into the ground. As here it stands the promenade deck is 25 feet above the floor, above which rises the funnel to a further height of 53 feet, thus giving a depth of 104 feet from the top of the funnel to the bottom of the keel, the former almost touching the roof truss of the building, and painted black with a band of white, as the distinguishing mark of the company, to which belong the well-known steamships, *Paris* and *New York*. The sides are studded with port-holes to a height of 17 feet above the floor, where the iron plating ends and the railing of the second or saloon deck begins. Above this is the first or promenade deck, and above all, the bridge, whence orders are given and the course of the vessel directed. Entering from the floor, the first compartment contains an array of models of steamers, for one of which, that of the *Paris* a gold medal was awarded at the Exposition of 1889. Next are the steerage quarters, with family rooms and single berths for men, with thorough ventilation and electric lighting, as in other portions of the ship. A stairway leads from the model room to the deck above, where are first and second-class cabins, the former with sofa and extension berths so arranged as to communicate when required for family use. Ascending to another deck, the visitor enters a large, open hall, handsomely finished in dark mahogany and



FIGURES IN TURKISH SECTION



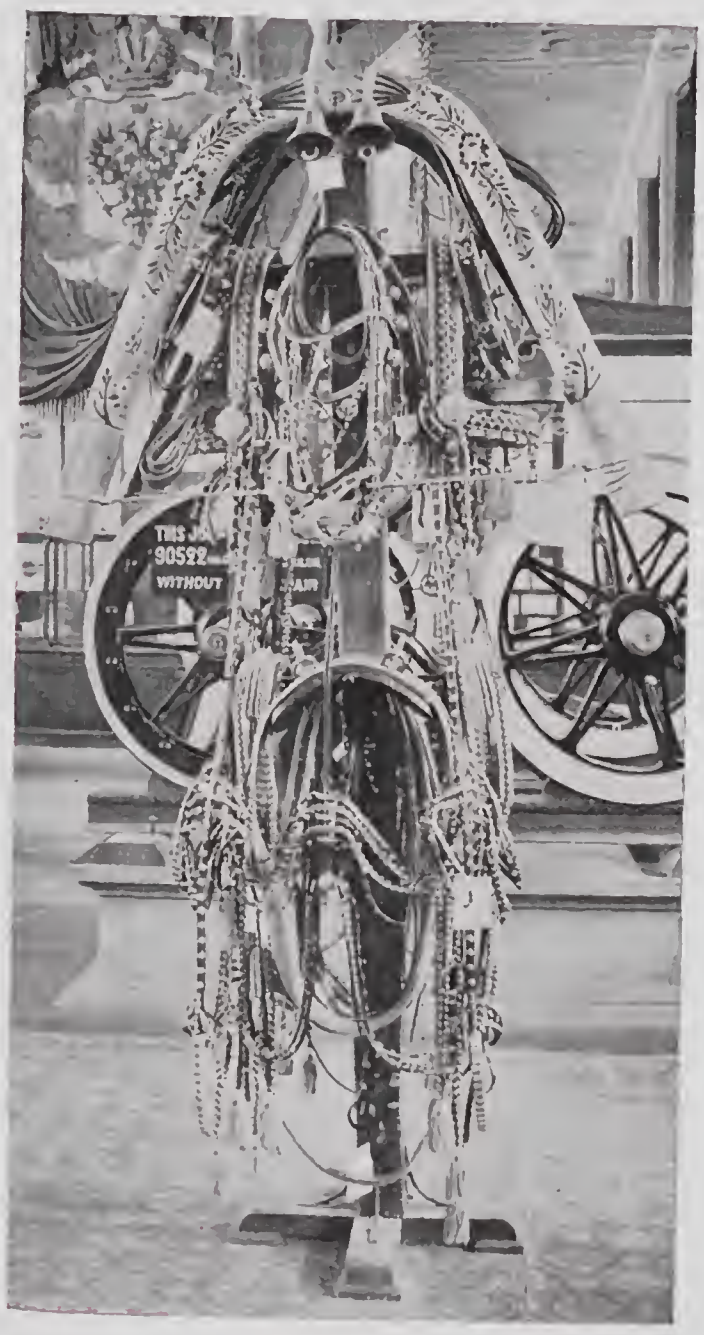
SUITS FOR RUSSIAN DRIVERS

gold. Passing thence to the right he comes to the dining saloon, with wood-work, chairs, and tables of white mahogany, and with walls and ceilings in light green panellings relieved by silver mouldings. In the centre is an arch of glass panels through which sunlight is admitted by day and electric light by night, its base supported by carved allegorical figures and surrounded with groups symbolical of commerce. At one end of this deck is a suite of rooms, the chamber containing a double bedstead with folding wardrobe and opening into a bath-room, while in the sitting-room the sofas can also be used as berths. The decorations of the suite are in ivory and gold, with upholstering to match, frescoed panels and ceiling artistically painted.



CORDAGE OF THE RUSSIAN NAVY

The highest or promenade deck is in three divisions, first of which is the hall around the stairs or companionway, corresponding with the one below and the same as to size and finishings. Then comes the library, with wood-work of dark mahogany, ceiling tinted in gold, and lighted by large square windows, above which are smaller windows for purposes of ventilation, the former covered at night by sliding sashes of leaded glass, fitted with electric burners. Seats upholstered in dark plush are ranged along the outer walls, with tables and writing materials. Finally there is the smoking-room, handsomely furnished as are all the rest, with carved mahogany chairs arranged in three sides of a series of hollow squares, and a table in the centre of each.



ARTISTIC SADDLERY

No wonder that 20,000 persons on an average passed daily through this sectional model exhibited by the International Navigation company. Here is in truth embodied the luxury of travel by sea, with carpeted floors, the richest of furniture, and all the appointments of a luxurious home. By Doctor Johnson a ship has been described as a prison house, with the additional disadvantage of the risk of drowning; but the good doctor did not make his historic journey to the Hebrides on board a modern transatlantic liner.

Passing from the promenade deck, one may step into the gallery of the Transportation building and there commence his examination of the large array of American marine exhibits, extending thence northward for several hundred feet. Here are not only exhibits from every portion of the United States, showing the present status of marine construction and its historic development, but from travellers, naval officers, consuls representing the government in many distant lands, and from foreign commissions are also numerous collections. In this section the main purpose is to illustrate the forms of marine architecture prevailing in the United States, the curios from other lands, serving as a foil to the specimens wherein are represented modern enterprise, ingenuity, and skill. For example, above the large model of a shipbuilding plant are suspended a black wooden canoe from the isthmus of Panama, and a raft of straw from Lake Titicaca, such as are used on the inland waters of South America. Near by is an old batteau, found on the banks of the upper St Croix, in Wisconsin, and contributed by the historical society of that state as an illustration of the

French-Canadian style of river craft in the early fur-trading days of the northwest. Though called a canoe, it weighs several thousand pounds, and was built to carry a score of voyagers and traders and a ton of goods.



AFRICAN BOAT MADE OF LOGS

Not far away are beautiful models of the Columbian caravels, with whose outlines we are familiar, and a number of cases filled with tiny models of Hindoo chairs, carts, rafts, boats, and canoes, with illustrations of the marine architecture of India, ranging from the luxurious barge of state which plies on the lake of Kashmir to the rounded piece of wood on which the native lies face downward, propelling himself with his feet and fishing as he goes.

In another section is a Venetian gondola, finished and furnished in ebony, near which are Alaskan canoes, in one of them the figure of a native fisherman and hunter armed with weapons of the chase. Here an Australian bark canoe may be compared with the Alaskan haida of cedar, and a boat from Hammerfest, Norway, with models of the craft which float on Chinese waters. Of all the collective exhibits from foreign lands, that which the Siamese commission has furnished is the most extensive, and the one most thoroughly typical of the country and people which it represents. It consists of about 100 models, including ponderous junks, in shape not unlike the Spanish caravels, and low tapering boats with sharp bows, similar in shape to racing shells, but inlaid with gold and pearl and otherwise decorated in oriental fashion. There are also craft intended for river service, for the sea, and for fishing and pleasure boats. In another department are models of carts, coaches, and sedans, both for common use and for weddings, festivals, and state occasions.

Turning again to the exhibits representative of modern naval architecture, may first be mentioned that of the Union Iron-works in San Francisco, near the gallery exit from the model displayed by the International line. Suspended from the roof of a handsome pavilion, broad festoons of silk serve as a canopy for realistic models of its workshops, ship-yards, docks, and vessels in process of construction or afloat on the waters of the bay.

In a section opposite is a relief map of the Nicaragua canal, a working model illustrating the projected system of locks, excavations, and dams. The map, which covers about 100 square feet, is constructed



SECTION OF AMERICAN STEAMER



STATE ROOM OF AMERICAN STEAMER

on a vertical scale of one to 2,000, and a horizontal scale of one to 30,000, this proportion allowing the engineering details to be plainly indicated, the points where work is being done or has been projected, being shown by patches of red. Lead pipes are molded into the ground work of the map, and when the water turned into them fills the beds of Lake Nicaragua and the San Juan river, the nature of the enterprise is at once understood. From a dam constructed about midway between the reservoir and the Atlantic, the waters of the river can be raised to a level with those of the lake.

In order to float a chip, which here represents a vessel, from the Pacific to the Atlantic, it must first be carried into a miniature canal cut for a mile and a half through the rocky ridge of the continental divide, lifted over three locks into the so-called Tola basin, and then set adrift in another cut, representing a canal eight miles in length. The distance from the Pacific ocean to Lake Nicaragua is only twelve miles, but from this side much of the heaviest work is yet to be accomplished, including the blasting of solid rock 70 feet in thickness. The route projected is across the lower end of the lake, south of the inactive volcanoes of Ometepe and Madera, past old Fort San Carlos, where light dredging is to be done through volcanic ashes, and into the Rio San Juan, through which for 64 miles it runs to the commencement of the eastern artificial channel. The channel, which is more than 30 miles long, contains three locks, and thus at length the vessel passes into the harbor of Greytown and the Atlantic ocean. Of the total distance from sea to sea, nearly 170 miles, Lake Nicaragua, San Juan river, and the natural basins furnish 142 miles of free navigation.

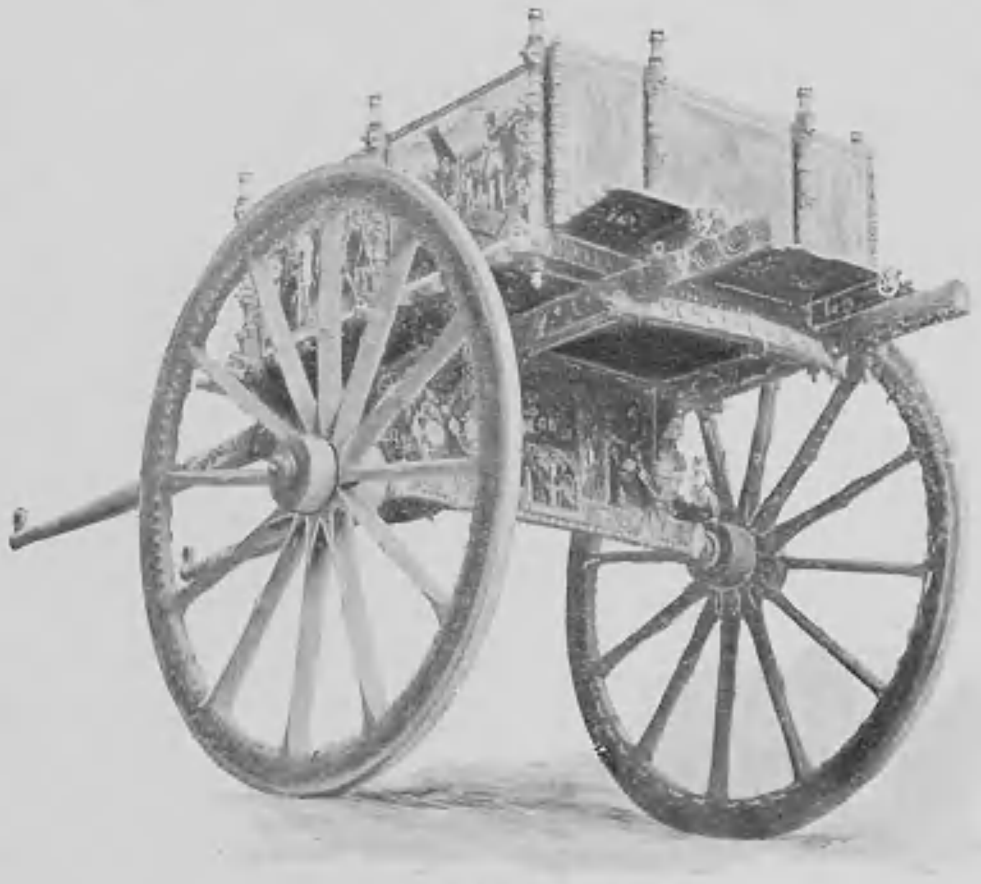
In an adjacent section is illustrated the construction of the huge log rafts and towboats of the Mississippi, and opposite is a collection of models, photographs, and paintings, showing how whaleback barges and steamers are built



DINING ROOM OF STEAM-SHIP



MADEIRA'S BULLOCK SLEIGH



PAINTED CART FROM SICILY



MOUNTAIN SLED USED IN MADEIRA



COLUMBIAN INDIAN WITH CARRYING CHAIR



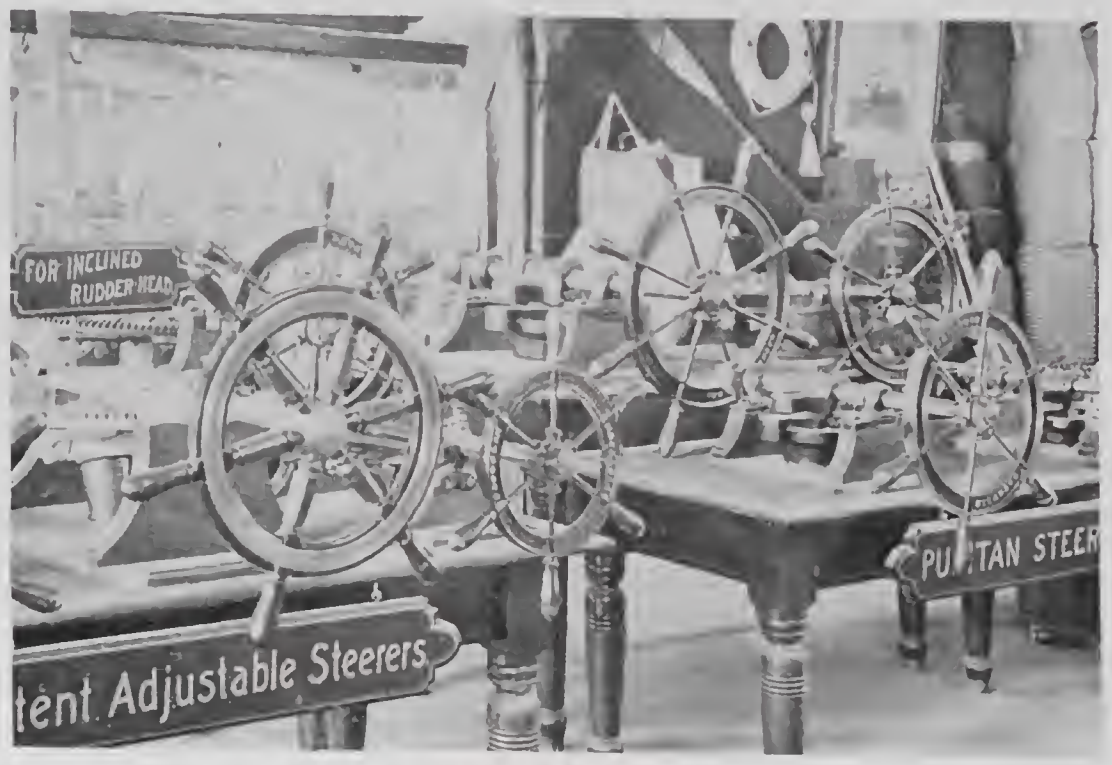
CARRIERS OF SOUTH AMERICA

MISCELLANEOUS EXHIBITS IN THE GALLERIES



SUITE OF STATE ROOMS

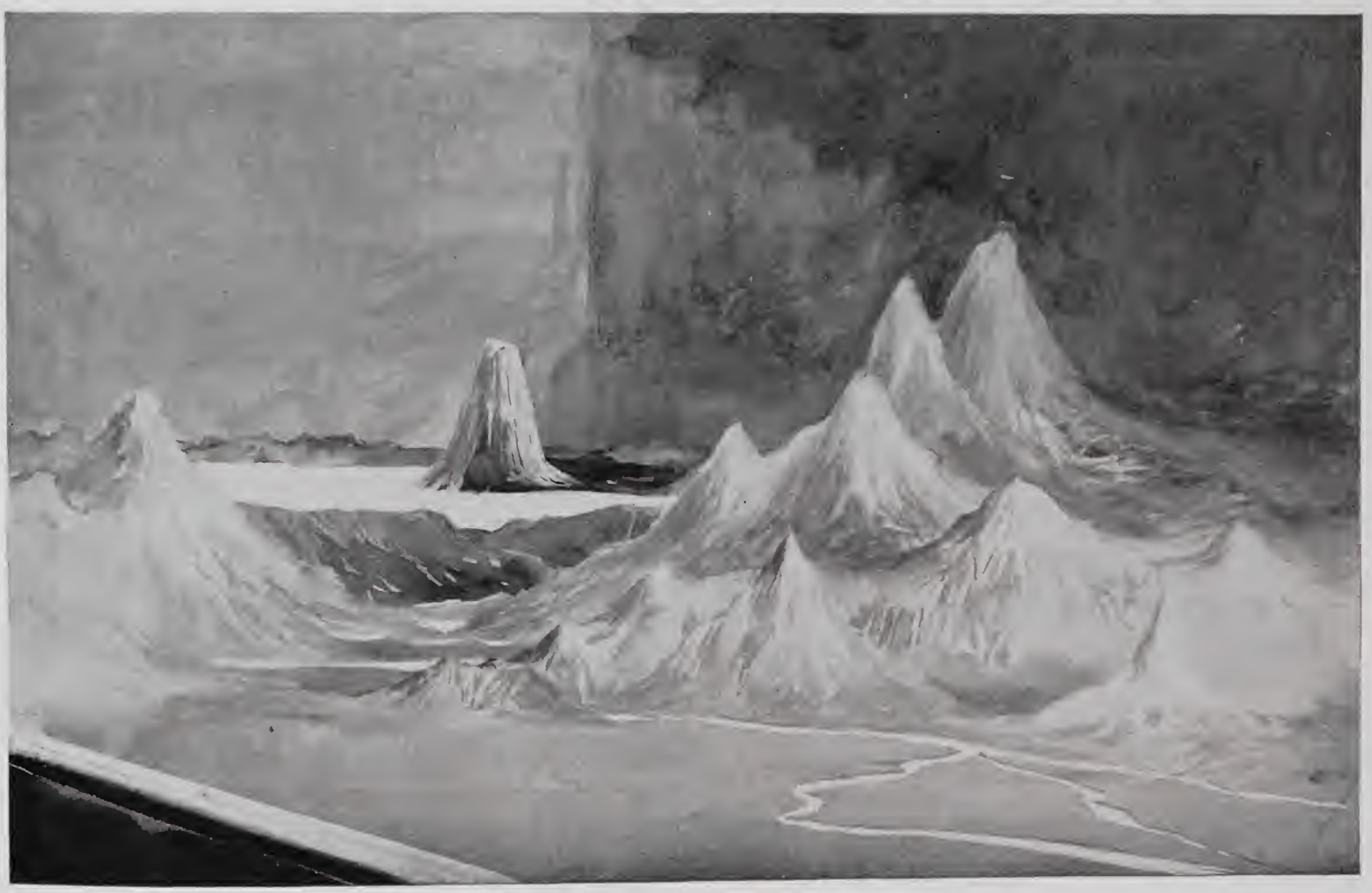
at the yards of a company whose headquarters are at Superior, Wisconsin. Near by is a relief map, resembling rather a plaster model of St Thomas island, in the Danish West Indies, by Charles E. Taylor. Here are reproduced, with remarkable fidelity of detail, the waves of ocean



STEERING APPARATUS

breaking on the shores, the fringes of cocoa palms that surround the island, the ships in the harbor, including the caravels which touched there, the dry docks, fishermen's huts, and the houses and streets of the seaport. Around it are terra cotta plaques and photographs presenting views of the island scenery upon a more extended scale.

In another relief map is shown the entire canal system of the state of New York, with the topography of the adjacent country clearly illustrated. This is the work of Martin V. Schenck, state engineer and surveyor, and with it are models of the doubled and lengthened locks, showing how the products of the west are conveyed rapidly and cheaply to the seaboard. Of historic interest is the model of the original lock built at Little Falls

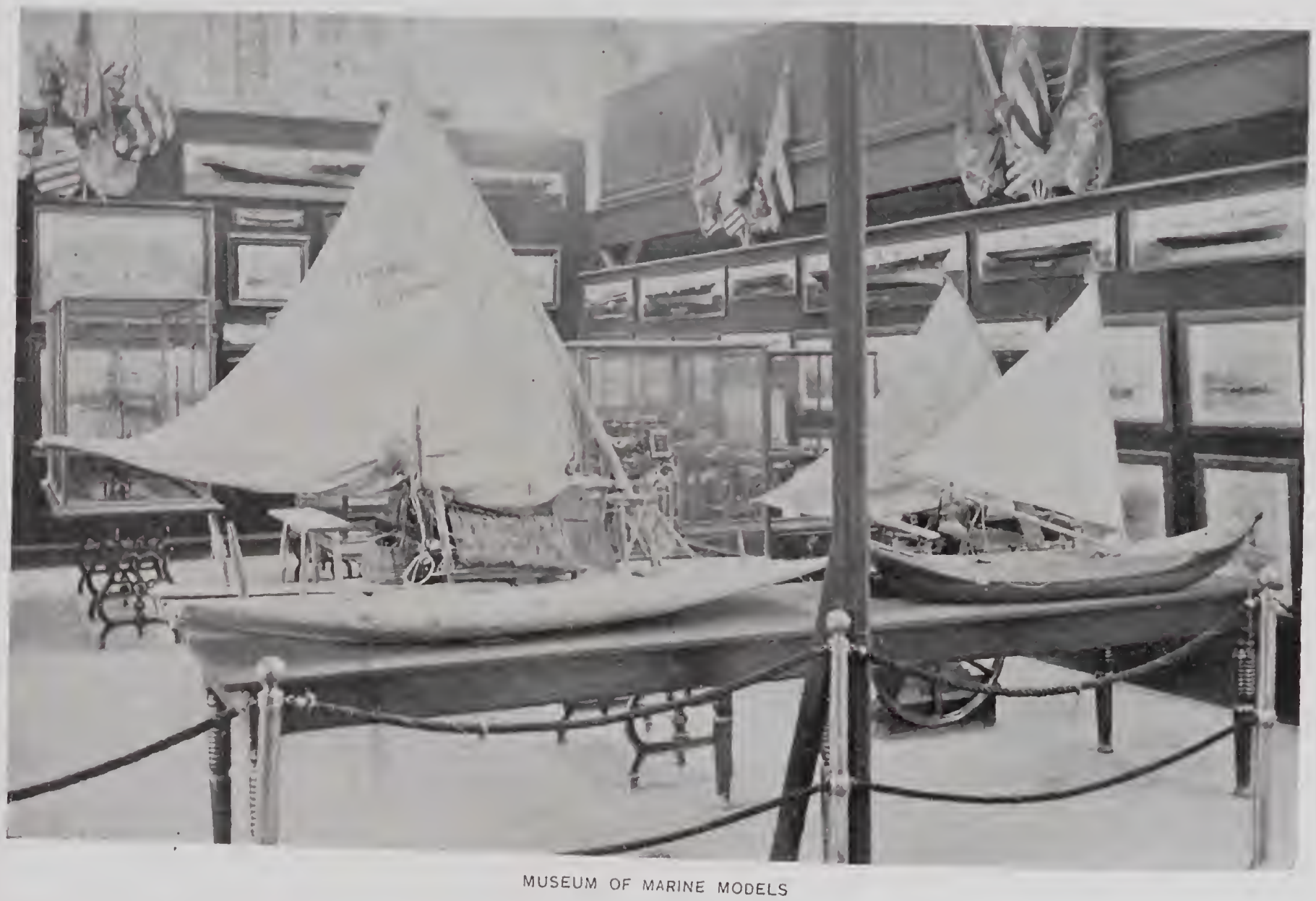


MODEL OF NICARAGUA CANAL



BLOCKS PULLEYS AND HOISTING GEAR

historic and pictorial. In the centre of a boat, for instance, are the original engine and boiler of the first twin screw steamboat, built by John Stevens, of Hoboken, New Jersey, in 1804. This is a portion of the exhibit of a ferry company of that city, and adjacent to it are models and pictures from a New York company, showing the architectural evolution of the steamers which ply on Long Island sound, from the Fulton to the latest craft launched from New England shipyards.



MUSEUM OF MARINE MODELS

Harper and brothers and other publishing houses have selected from the best of their art works, extending over many years, sketches, drawings, and engravings, representing modes of transportation among many peoples and countries, ranging from the war canoes of the Congos to the cruisers of the white squadron, and from the bullock cart of Siam to the steam leviathans of modern railroads. In one section may be traced the development of our naval architecture, and in another is shown the excitement produced in the land of the Pharaohs by the advent of the bicycle. In addition to these collections are several galleries filled with paintings of marine subjects. Among them are scenes along the coast of Jersey, some of them depicturing the dangers that confront the pilots of Sandy hook. Here also is Farragut's fleet and the harbor fronting the World's Fair city. But the most complete exhibit, one illustrating the development of the merchant service of the United States together with ingenious types of oriental craft, is that of the Essex institute



VENETIAN GONDOLA AND ALASKAN BOAT

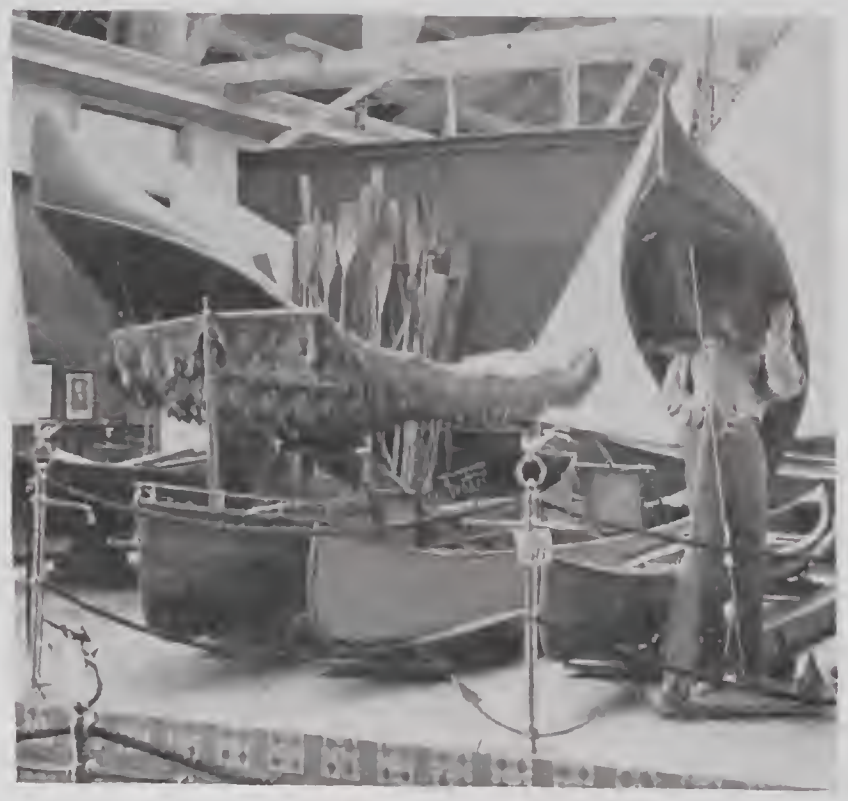
in 1795. In still another map covering an entire wall is shown the water route from New York to Duluth, and there are photographs of canal steamers, aqueducts, and points of interest along the Erie route, with statistics covering the entire history of the system.

In a modest booth, not far away, the state commissioners of Maine have models of famous ships which have sailed from their ports, and in a corner of this section is a small old-fashioned cannon, captured from the British brig *Boxer* during the war of 1812. Beyond a pavilion which contains the models of the ship-yard and steamers of a Virginia company, the exhibit is largely

and Peabody academy of Massachusetts. Salem is one of the oldest seaports in the country, and the pictures of her ships, some of them water colors by Ross Turner, cover the period from 1765 to 1893. There are also



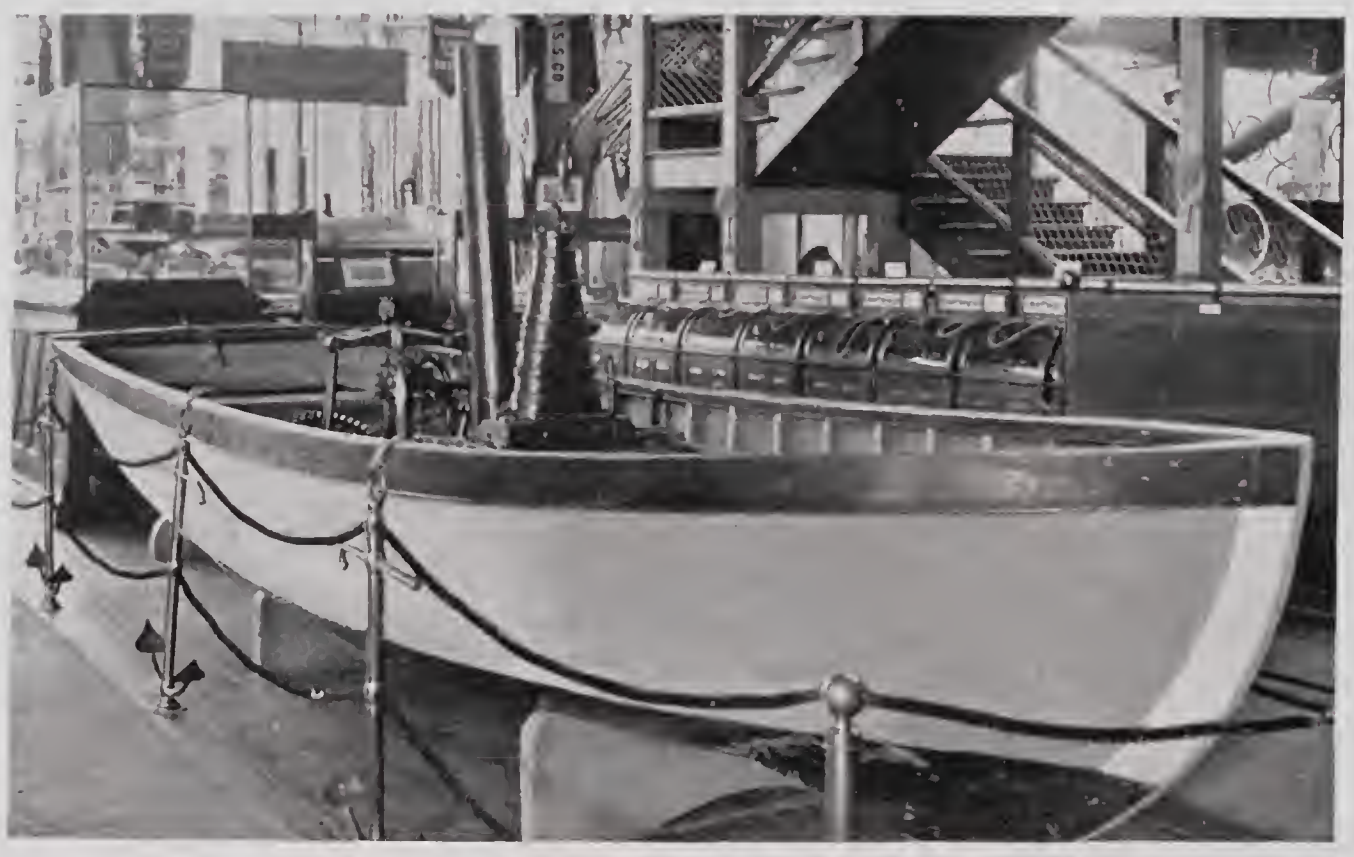
BRAZILIAN CRAFT



OF INTEREST TO SPORTSMEN

models of old English frigates, as of the *Sovereign of the Seas*, launched in 1637, in contrast with which are those of Chinese freight and fishing craft, and a mandarin dragon or racing boat.

The marine display of Great Britain is on the ground floor of the Transportation building. Here is a complete representation of the history of British ship-building for more than three-score years, showing the progress made in the construction and equipment of her naval and merchant service, her steamers and sailing vessels, torpedo boats, launches, tugs, and the craft used for river and lake navigation. By the Thames Ironworks and Shipbuilding company is illustrated in models the development of the British iron-clad, beginning with the *Warrior*, launched in 1860, and then believed to hold the navies of the world at her mercy. Her armor, more than four inches in thickness would resist a 68-pound shot, then the heaviest projectile used, and as was thought the heaviest that could be used; but year by year the invention of more powerful weapons called for heavier armor, until to-day 20-inch plates are considered none too thick for a first-class line-of-battle ship. In other models the history of naval architecture is brought down to the present time, the list including the *Minotaur*, successor to the *Warrior*, but of larger size, the *Sanspareil*, of 10,500 tons displacement and 14,000 horse-power, and the steel cruisers *Blenheim* and *Theseus*, both with a speed of more than twenty knots. Then there are war vessels built for various foreign nations, with steam and sailing yachts and craft for special service.



TWIN SCREW AND BOILER OF "JOHN STEVENS" BOAT

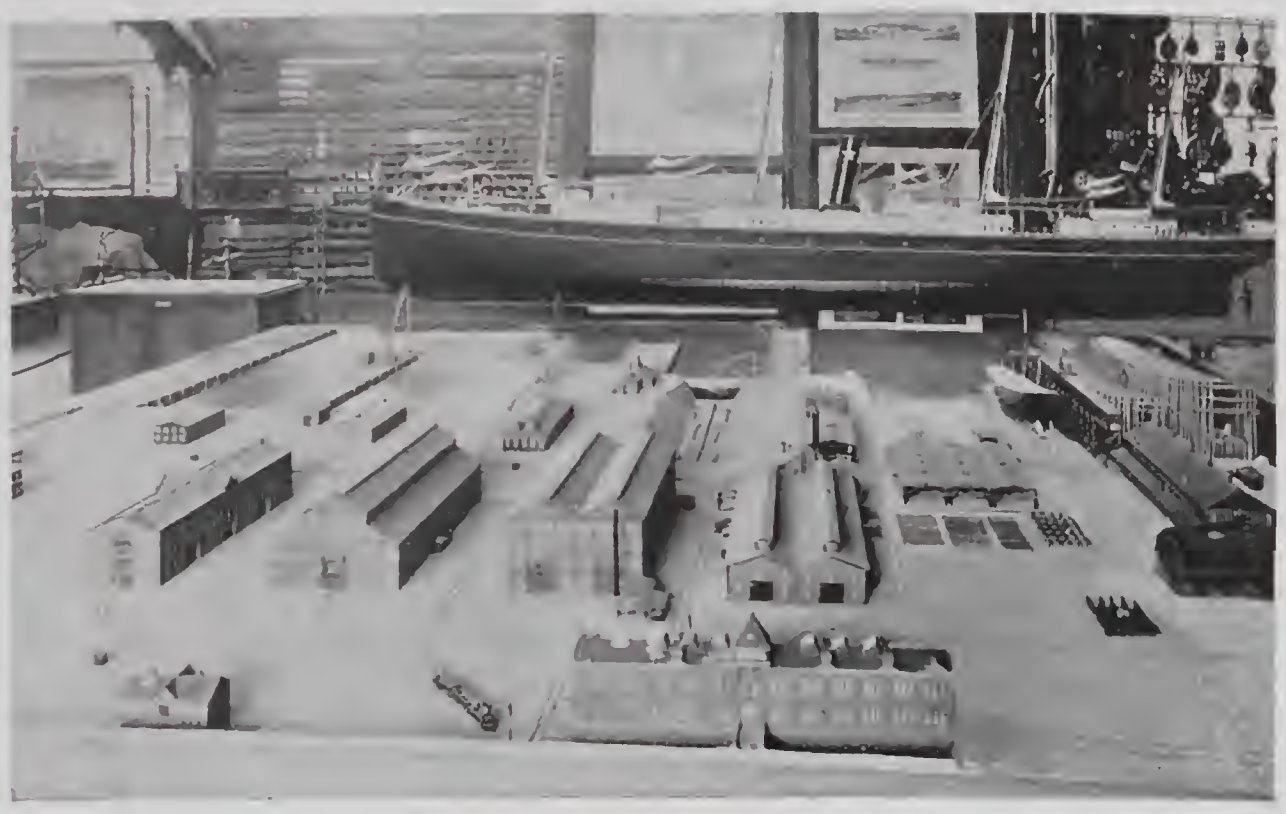
From the works of Armstrong Mitchell and company, at Newcastle-on-Tyne, comes probably the largest model of a ship that was ever exhibited. It is that of the ill-fated *Victoria*, reproducing on a scale one-twelfth of the original size, and with all her armor and equipments to the smallest minutiæ of detail, a 10,500 ton vessel, 360 feet long and one of the most powerful of her class. Only the star-



FOLDING BOATS FROM MICHIGAN

board side is presented; but in the mirrored background is viewed the entire ship resting on an unruffled sea, amid the accessories of naval warfare imitated in most realistic fashion. The model and its guns are of steel and nickel plate; the anchors and cables of polished steel, with boats in fac-simile, and a netting of wire for protection against torpedoes. Another model is that of the *25 de Mayo*, a cruiser built by this firm for the Argentinian government.

From a Clydebank firm are models of several war vessels, including the *Ramilies*, launched in 1892, one of the most powerful battle-ships afloat, and the *Reina Regente*, a Spanish cruiser which took part in the naval review in New York harbor, with channel and Atlantic steamers, the latter with a speed of twenty-three knots an hour. A London house shows models of torpedo boats and torpedo boat catchers, with one of the *Opale*, built in sections for the French

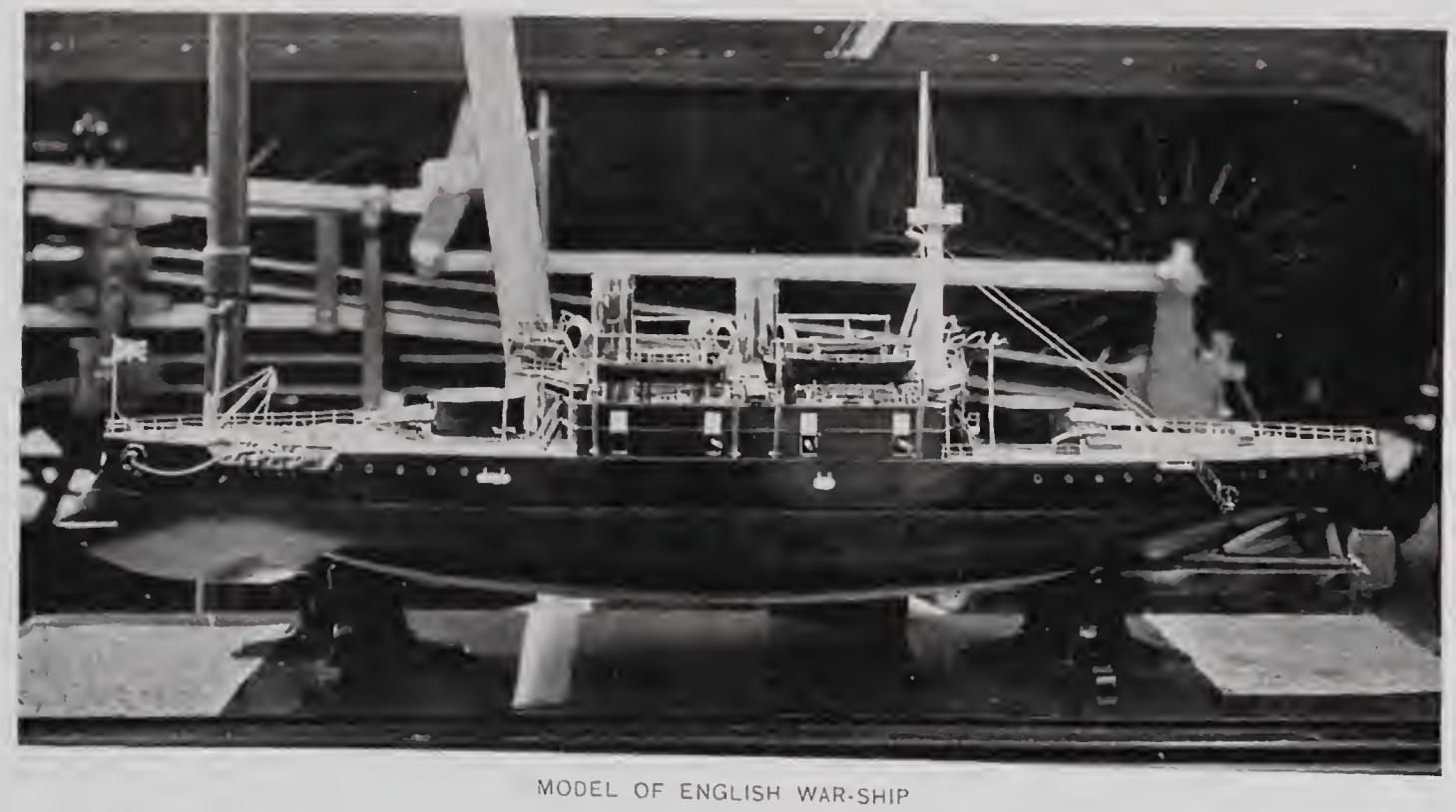


MODEL OF VIRGINIAN SHIP YARD



PORTION OF THE BRITISH MARINE SECTION

government during the Dahomey campaign. From the Sheffield works are exhibits of armor plates and naval apparatus, and from other firms are quick-firing guns, including those of the Nordenfelt and Adamson patterns.



MODEL OF ENGLISH WAR-SHIP

In the display of the Cunard Steamship company are models of its most powerful vessels, beginning with the *Britannia* of 1,139 tons and 740 horse-power, built in 1840, and ending with the *Campania* of 12,500 tons and 24,000 horse-power, launched in 1893, the latter 620 feet in length, or only 60 feet shorter than the *Great Eastern*. All the models were constructed by the company's naval architects, on the scale of one fourth of an inch to the foot. They are contained in glass cases, resting on carved oaken tables, and with ivory tablets descriptive of each of the exhibits.

In smaller models the Peninsular and Oriental company illustrates, in periods of a decade each, the various types of steamers used and now in use since first it took the field, in 1837, with two vessels little



DISPLAYED BY THE STATE OF MAINE

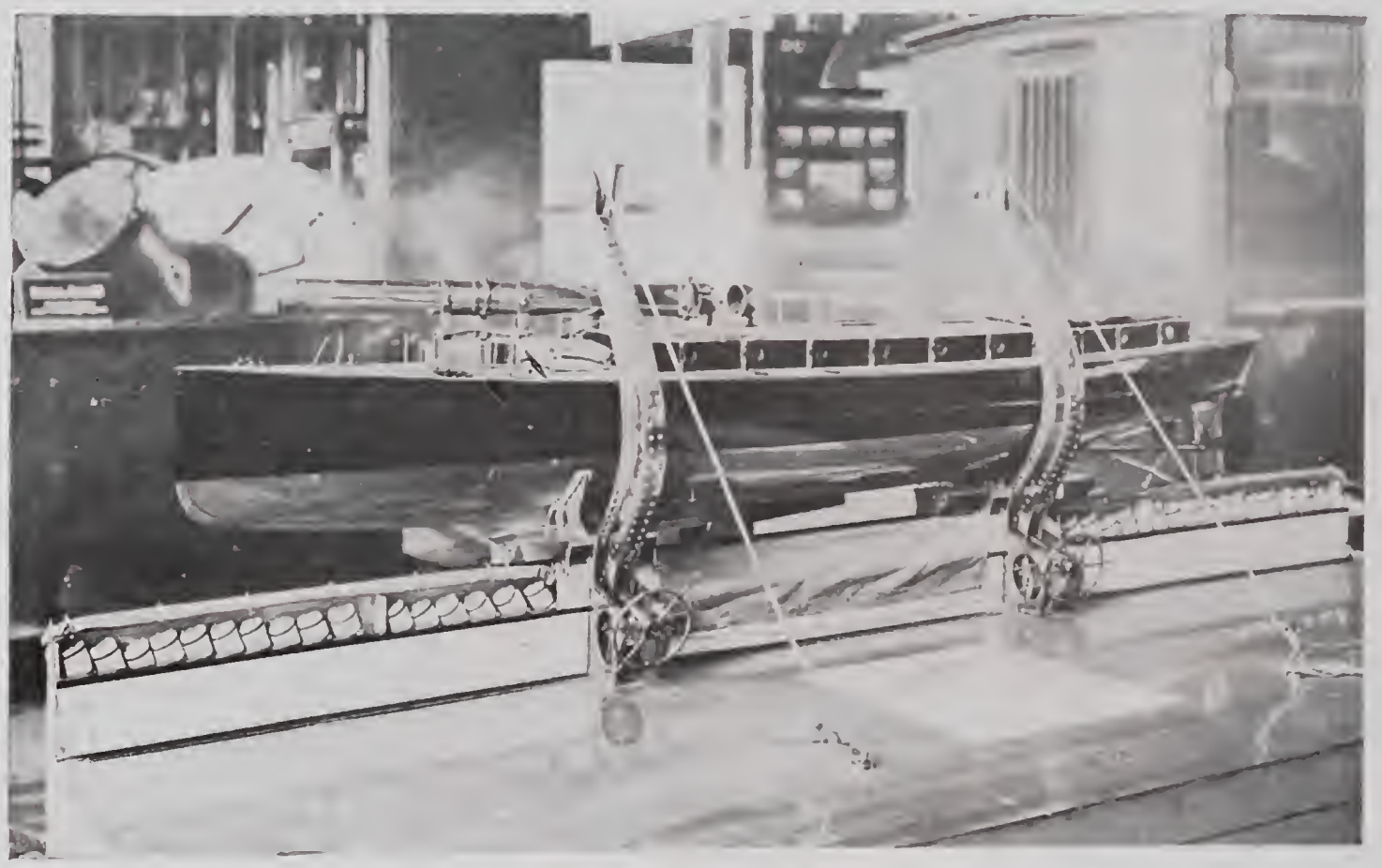
larger than the life-boats which to-day its ocean greyhounds carry. In map form are shown all parts of the world to which its service extends, and information is here afforded as to the progress of naval architecture and engineering during the term of the company's existence. The operations of this company are on a gigantic scale, with nearly threescore steamers plying on the Atlantic, Pacific, Mediterranean, and Indian oceans, representing a value of $35,000,000, and with subsidies of $1,650,000 a year from the British and other governments. In return, more than one-half of their boats are armed as cruisers, ready for instant service, and all are subject at the briefest notice to the orders of the British admiralty.



A COSMOPOLITAN TOURISTS' COMPANY

From the Laird brothers, of Birkenhead, is also an elaborate collection of historic models, one being that of the steamer, *John Randolph*, launched in 1834, and another a reproduction of a steam-yacht built for the Vanderbilts in 1893. Among them are represented vessels built for the Chilean navy, the cause of recent troubles with the United States. The Atlantic Transport line, whose headquarters are in London, reproduces the twin-screw steamers which carry live-stock and meats in the carcass from American to British ports. A West Hartlepool company shows one of its cargo steamers, constructed of steel on the web-frame system, and carrying a dead weight of 6,500 tons. Elsewhere are models of the paddle and screw steamers built at Dumbarton works, and of those engaged in the mail service between England and South Africa. From other firms, models, apparatus, rigging, and naval equipments of many kinds complete a varied and interesting display.

In connection with the British marine exhibit may be mentioned that of the well-known firm of Cook and son, which, beginning operations in July 1841, when a few hundred passengers were carried a short distance by excursion train at the rate of a shilling a head, issued in 1892, nearly 4,000,000 tickets, for routes extending over more than 1,800,000 of railroad, ocean, lake, and river. The display consists mainly of models and publications descriptive of its system of transport and travel in various countries and periods. Among the models are those of vessels built for tourist service on the Nile, one of them, the *Rameses the Great*, being shipped to



MINIATURE MAN-OF-WAR

Cairo in sections filling 3,750 cases, and there put together by 400 workmen, with the use of 70,000 rivets. Of dahabeahs, built specially for voyaging in comfort on the Nile, there are several specimens. Here also are models of ancient funeral boats, said to have been disinterred from the tombs of Upper Egypt, 4,000 years ago; and copied from the originals at the royal arsenal at Venice, are reproductions of Venetian gondolas from the 15th to the 19th century. In another model is presented the Egyptian temple of Edfou, a Ptolemaic structure with massive walls and propylon towers, which, in the pre-Christian era, served at once as military stronghold and priestly tabernacle. In photographs are displayed some of the company's offices, forming a continuous chain around the civilized countries of the world.

In the Canadian section near by, the largest of the marine exhibits consists of models of steamships plying between British Columbian ports and those of China and Japan, in connection with the service of the Canadian Pacific railway. A study of these models, in connection with the railroad display already described, will explain



IN THE PAVILION OF A GERMAN STEAMSHIP COMPANY

in part how it is that this powerful corporation is gradually wresting from the United States the most valuable portion of the foreign commerce of the Pacific coast. From private firms are smaller craft, both as models and originals, and by the department of public works at Ottawa is reproduced its system of locks and canals.

Prominent among the ground floor exhibits of Germany is that of the North German Lloyd Steamship company, an organization owning about 60 ocean steamers, with a total registration of some 200,000 tons, running to North and South American, Asiatic, and Australian ports. Its display is arranged in a neat pavilion, and consists mainly of models of its vessels and charts and maps illustrative of its operations, one of the latter showing the exact position of each of its steamers at a given hour of the day. By the Hamburg-American Packet company are shown models of its fastest boats, contrasting strangely with the reproduction of a primitive craft on which they stand.

In the southern galleries are models of ships constructed within recent years for the imperial navy or for the more prominent transportation companies. Among ironclads is the *Kaiserin Augusta*, which held the post of honor in the German squadron at the naval review in New York harbor. In plans and models are also traced the principal inland waterways of the empire, the most striking exhibit of this character being from the imperial canal commission. It includes a reproduction of the harbor and dry-docks at Kiel and a large relief

map showing the course of the northeast canal from the river Elbe to the Baltic, and the physical nature of the country through which it passes. Of the curios in this section may be mentioned the model of an ancient boat, the original of which, 75 feet in length, was found in the frozen marshes of the Baltic sea.

The marine division is but a portion of a collective exhibit of engineering installed in the southern galleries, including plans and models of harbors, railroads, and bridges constructed by the government, with diagrams of public establishments and illustrations, in many forms, of the sewerage, water, electric, and gas systems of the principal cities of Germany. Most of the contributions are from municipal governments, especially from those of Berlin and Frankfurt. From the imperial capital are publications and plans of its asylums for the insane and epileptic, of public markets and bathing establishment, and of its sewage system, with the places where the fertilizing refuse is deposited. There is also a beautifully constructed model of the Kaiser Wilhelm bridge, with plans of structures of lesser note. A pavilion



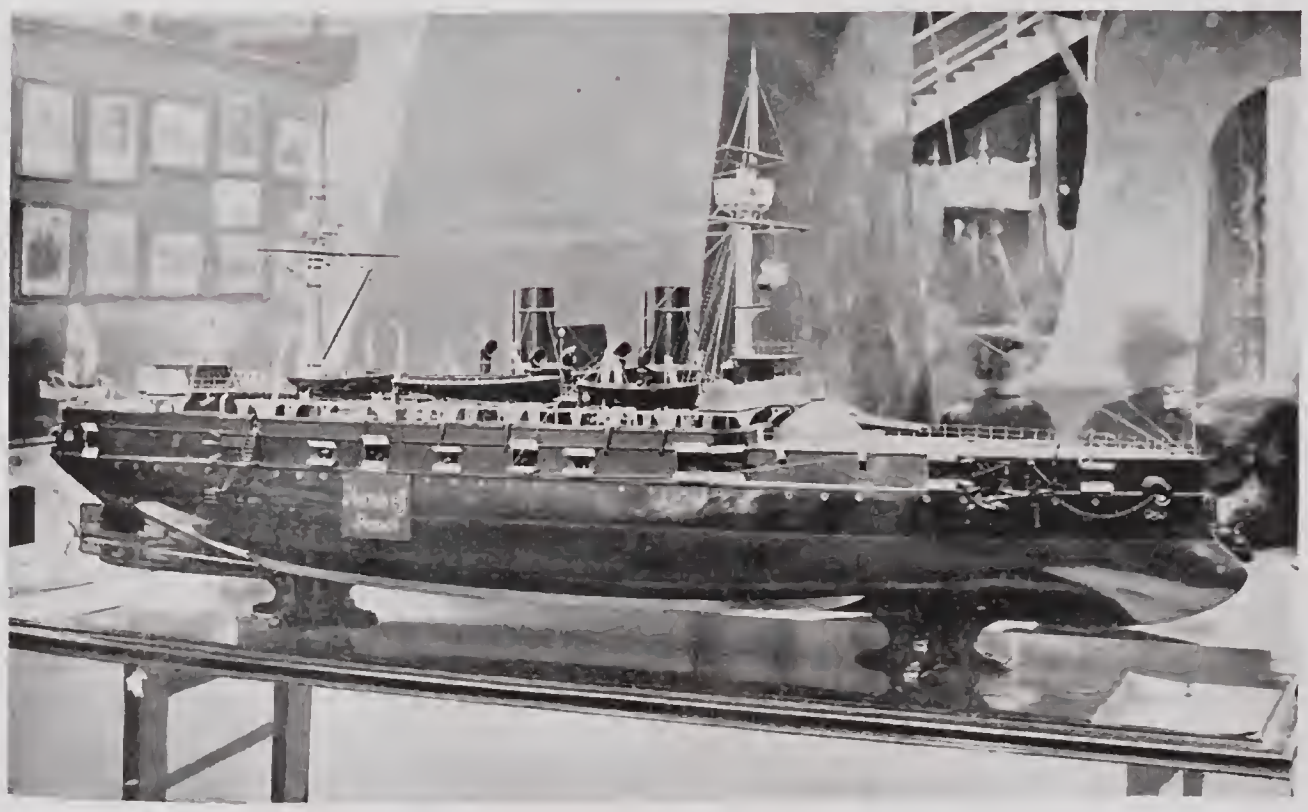
contains the exhibit from Frankfurt-on-the-Main, the chief object of which is to illustrate by drawings, plans, and descriptions the new water supply and drainage works of the municipality. Details are presented as to flooding, ventilation, house-drainage, and siphon construction, and the machinery used for preparing chemical disinfectants and for removing the slime from disinfecting tanks.



SCENES FROM THE FRENCH DIORAMA

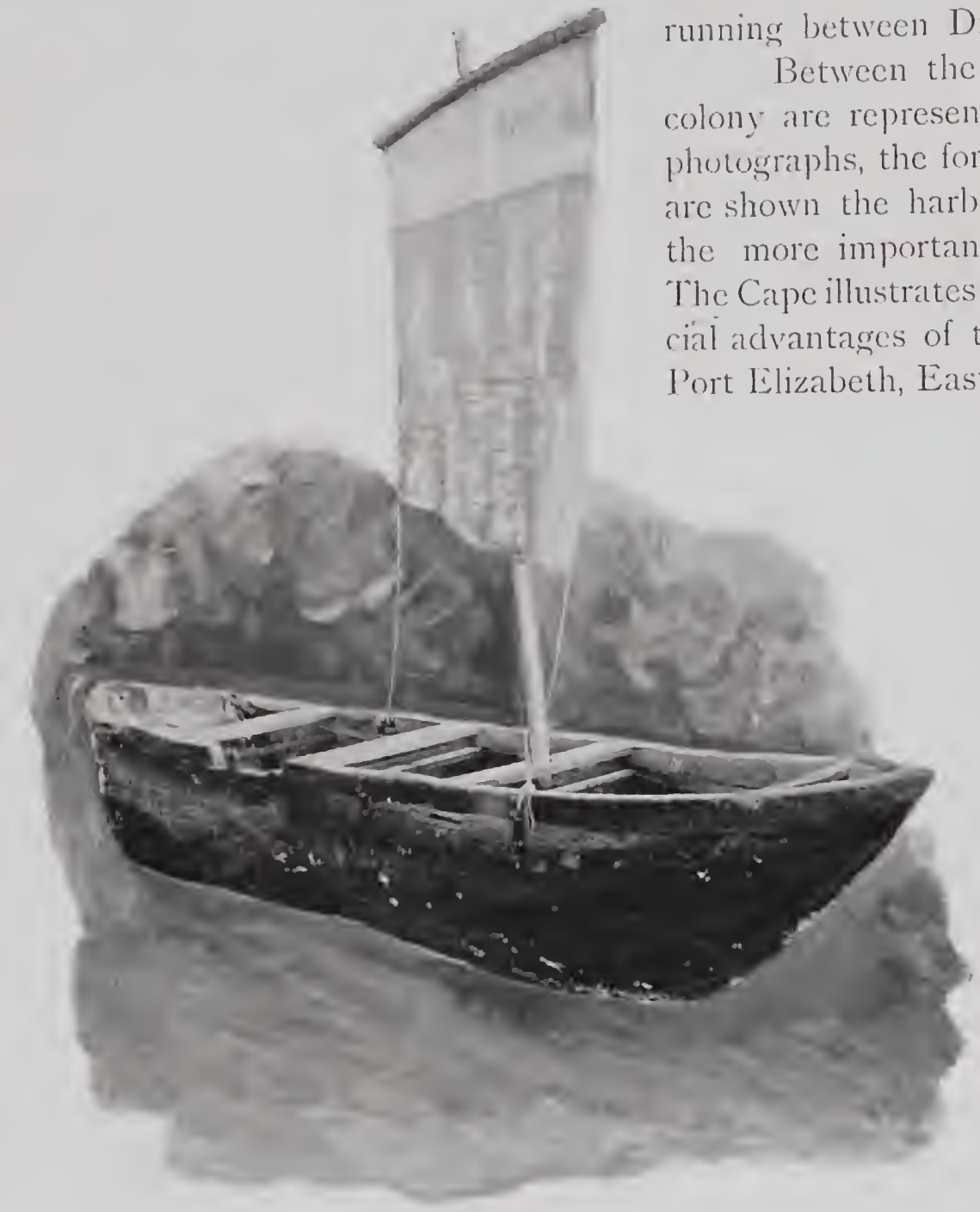
In addition to the collections specially prepared by the imperial and local governments, there are private exhibits in the engineering department. One company presents models of various apparatus for distilleries, breweries, starch, sugar, and yeast factories; another exhibitor shows his plans for what he considers model agricultural buildings; and elsewhere are reproductions of pottery works, smelting furnaces, and mining machinery, while specialists indicate how life-boats may be built of aluminium, with the latest ideas regarding the construction of dredging and hydraulic machinery.

In the French gallery section the General Transatlantic company has eight large paintings or dioramas by members of the salon which caused so much comment at the Paris Exposition of 1889. Each picture is at the back of a booth, the entire framework being of a rich maroon, so that the visitor seems to be looking into the scene rather than at it. Now he sees the embarkation of passengers at Havre for New York, with the waving of handkerchiefs, tearful embraces, and farewells. Next is the dining-room with passengers engaged in conversation over their meal, and then the smoking-room where men are enjoying their cigars and wine, their cards and backgammon. Near by are depictured the arrival of an African steamer at Marseilles, and a French boat at the harbor of Algiers, with the workshops of the company and a steamship in process of construction. There are also models of several of the finest boats, especially those which run between Havre and New York. Another notable feature is the exhibit from the chamber of commerce at Dunkerque,



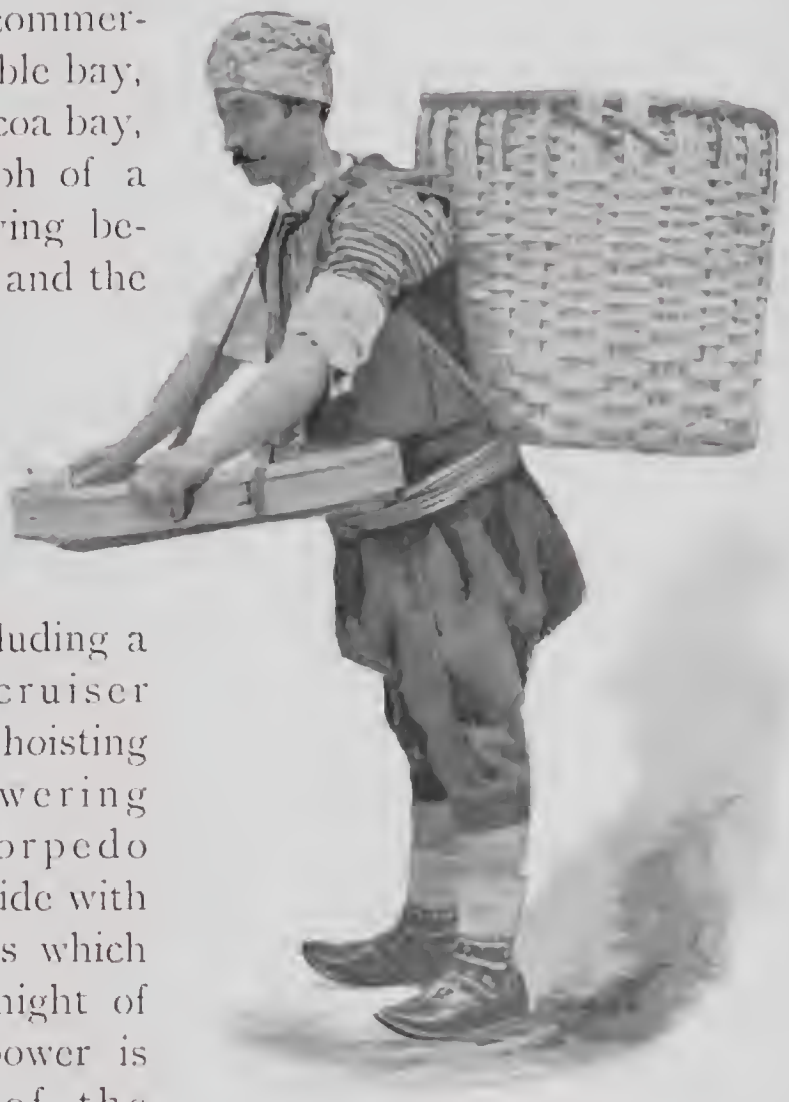
MODEL OF MAN-OF-WAR

including a mammoth painting and a relief map showing the harbor and dockage system of the port. In this vicinity, as an exhibition of industrial art, are several large screens of opalescent glass. Finally, there is reproduced in the French section on the main floor the cabin of a channel boat running between Dieppe and New Haven.



CANOE, FROM AFRICA

Between the German and French sections the Netherlands and Cape colony are represented in the gallery by small collections of drawings and photographs, the former contributed by the Royal institute of engineers. Here are shown the harbors of Rotterdam, Amsterdam, and Batavia, with views of the more important waterways of Sumatra. The Cape illustrates the beauties and commercial advantages of the harbors of Table bay, Port Elizabeth, East London, and Alcoa bay, with a photograph of a mail steamer plying between the colony and the mother country.



A TURKISH CARRIER

In Russia's section, on the ground floor, is a large exhibit from her naval department, including a model of the cruiser *Rurik*, with the hoisting apparatus for lowering and raising torpedo boats. Side by side with the miniatures which stand for the might of Russia's naval power is a reproduction of the *Yahl*, the boat in which Peter the Great first learned to love the sea and formed the plans that resulted in the founding of the navy, of which the original of this tiny craft, less than eleven feet in length, has been called the grandfather. Elsewhere are coils of rope such as are used by men of war; and beyond is a small model of a train of military hospital cars, the history and present condition of the naval department being also represented in government literature.

Across the hall is an exposition of the work which has and is being done by the naval department of Japan. One of the walls is covered with charts, maps, and inscriptions explanatory of the work of the hydro-



FULL SIZE MODEL OF BATTLE SHIP "ILLINOIS," IN WORLD'S FAIR HARBOR

graphic office, established in 1870. There are drawings showing the configuration of the coasts, their safe channels and their dangerous reefs, and here the statement is made that this is the first attempt by any Asiatic country to furnish its navigators with nautical charts, the progress achieved in this direction being without the aid of foreign engineers. In this section is a modern rapid-firing gun with automatic recoil carriage, and there are models of steamships, one of them showing a transverse section, and of a boiler intended for a Japanese cruiser fashioned by the students of the dockyard school at Yokosuka.

Among the curiosities in the northern gallery are the log canoe and dugout sent by the United States consul at St Paul de Loando, the capital of a Portuguese colony on the western coast of Africa. The canoe,



THE GOLDEN DOOR AND ITS REFLECTION

or so-called bimba, resembles the catamaran, its frame resting on a raft as in Chinese river craft. These clumsy devices are also reproduced in photographs, the dugout containing a dusky occupant whose naked body glistens as brightly as the waters that surround him.

Near the Austrian section on the ground floor of the hall, Spain illustrates the historic development of her naval architecture. Almost side by side with models of the Columbian caravels are the iron-clads of her modern navy, and in prints on the outside of the booth may be traced the evolution of her merchant marine and war ships up to the present day. From the arsenal at Cartagena and the manufactories of Barcelona are cables, cordage, and other nautical appliances.

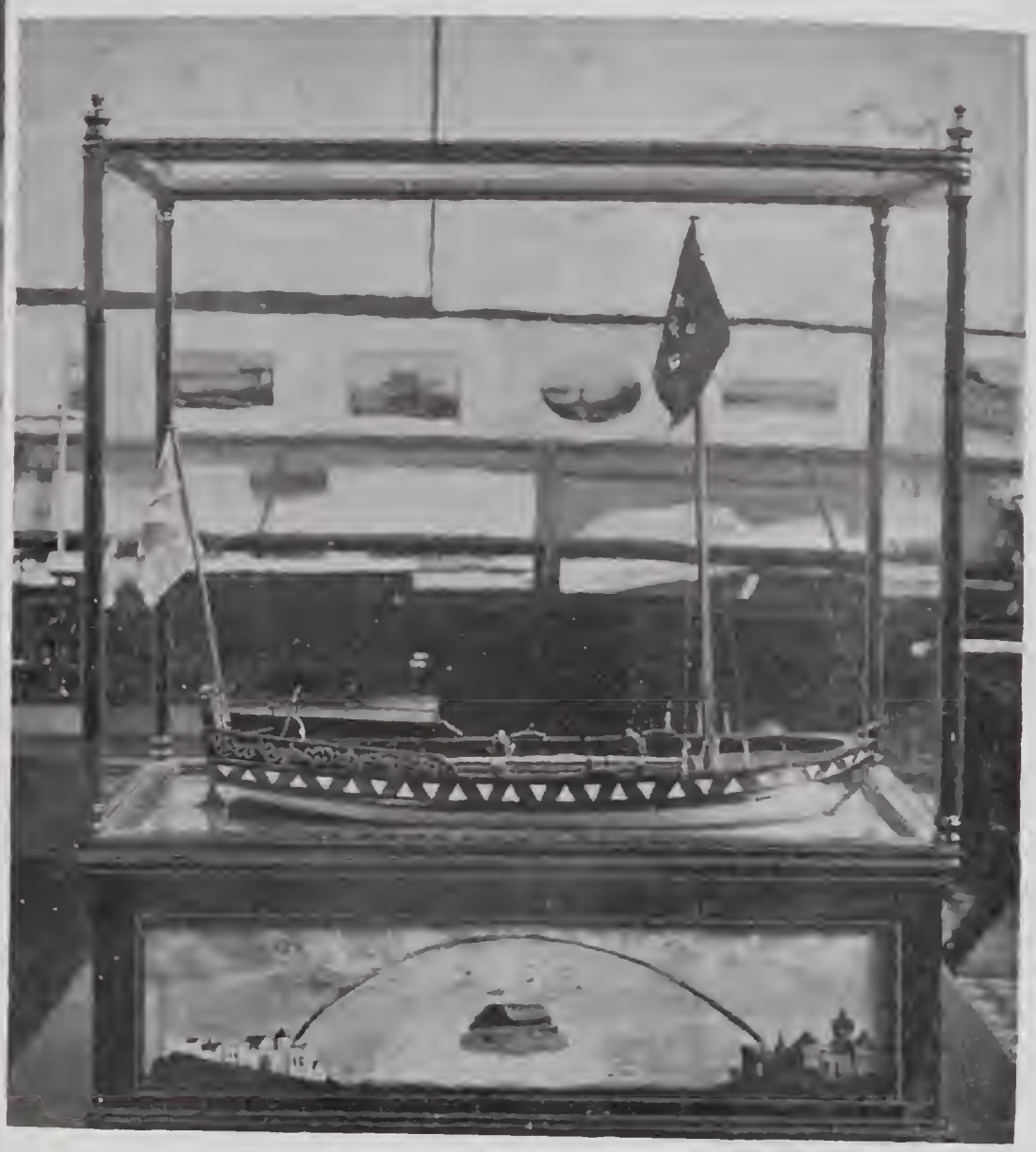
In the northeastern portion of the annex, and in the northern part of the main building, small sections are occupied by Spain, showing the character of her coast defenses and other engineering works, with the progress made in the construction of her weapons. From the museum of royal engineers comes a large collection of models of such fortifications as those of San Sebastian and Cartagena. The plan of the Havana water-works and bridges, ancient and modern, including the one at Cordova, are also reproduced. The manner of transporting bridges on the backs of donkeys, during a military campaign, is elsewhere illustrated, and in this section is a case filled with the swords, halberds, and other mediæval arms of Toledo make. In the annex are models of fire-arms, and a long array of cannons a contribution from the king, some of them dating almost from the time of Cortés.

In the United States section devoted to naval warfare and coast defense, a few manufacturers illustrate

some of the most recent appliances, a Massachusetts inventor, for instance, showing a pneumatic dynamite gun, with torpedoes as projectiles. But in this group the main exhibit is from the Bethlehem Iron company, of Pennsylvania. Toward the south of the hall, rising almost to the roof and astride its central aisle, is a gigantic frame, apparently of solid iron, supporting



THE BETHLEHEM STEAM HAMMER



IN THE GALLERY

by the fact that it would almost have blocked the central passage-way of the building. Here, then, is the shadow of the huge implement which welded the armor plates, steamer shafts, and other massive articles grouped in this section of the hall. A plate of steel armor, more than ten inches thick, is shown as battered by a shell travelling 700 feet a second, and near it is the first plate made by the company in 1891, two 100-pound shells having pierced its eleven inches of solid metal. A nickel steel plate for the battle-ship *Indiana*, protecting one of her thirteen armored sections, is 17 inches thick, 12 feet high, and weighs nearly 70,000 pounds. Near by is the model of a casting for heavy armor plates, 18 feet high, nearly half as wide, and 52 inches thick, with a weight of 25,000 pounds. By way of suggesting how such armor can be penetrated, the company shows a piece of naval ordnance, 36 feet long, weighing more than 50 tons, and with a twelve-inch breech. The manufacture of shafting requires even more skill than that of gun forgings,

a huge hammer of cylindrical shape. This imposing structure, 90 feet in height, with a span of nearly 40 feet, is a reproduction of the apparatus which carries the steam forging hammer of the Bethlehem works. The original mechanism weighs more than 2,000 tons, and the ram and rod 125 tons, forming the largest hammer in the world. The replica is of wood and staff, and the absence of an anvil is explained



PROJECTILES FOR HEAVY ORDNANCE



GOODS FOR THE EXPOSITION

and the exhibit in this line includes a hollow shaft for the Old Colony Steamboat company about 40 feet in length, and finished cranks for the cruiser *Minneapolis* and the steamer *City of Sydney*, of the Pacific Mail line.

Another extensive exhibit of ordnance is that of the Hotchkiss company, in an outdoor space adjoining the annex on the southeast. Projectiles for rapid-firing guns are shown, with pierced steel plates from one to four inches in thickness. There are naval landing guns with a range of nearly a mile, rapid-firing cannon carrying shells of from one to fourteen pounds, and various specimens of the revolving style and those which are best adapted for use in a rough or mountainous country, together with horse battery caissons carrying as much as 96 rounds.



MAN'S UNIVERSAL BURDEN BEARER



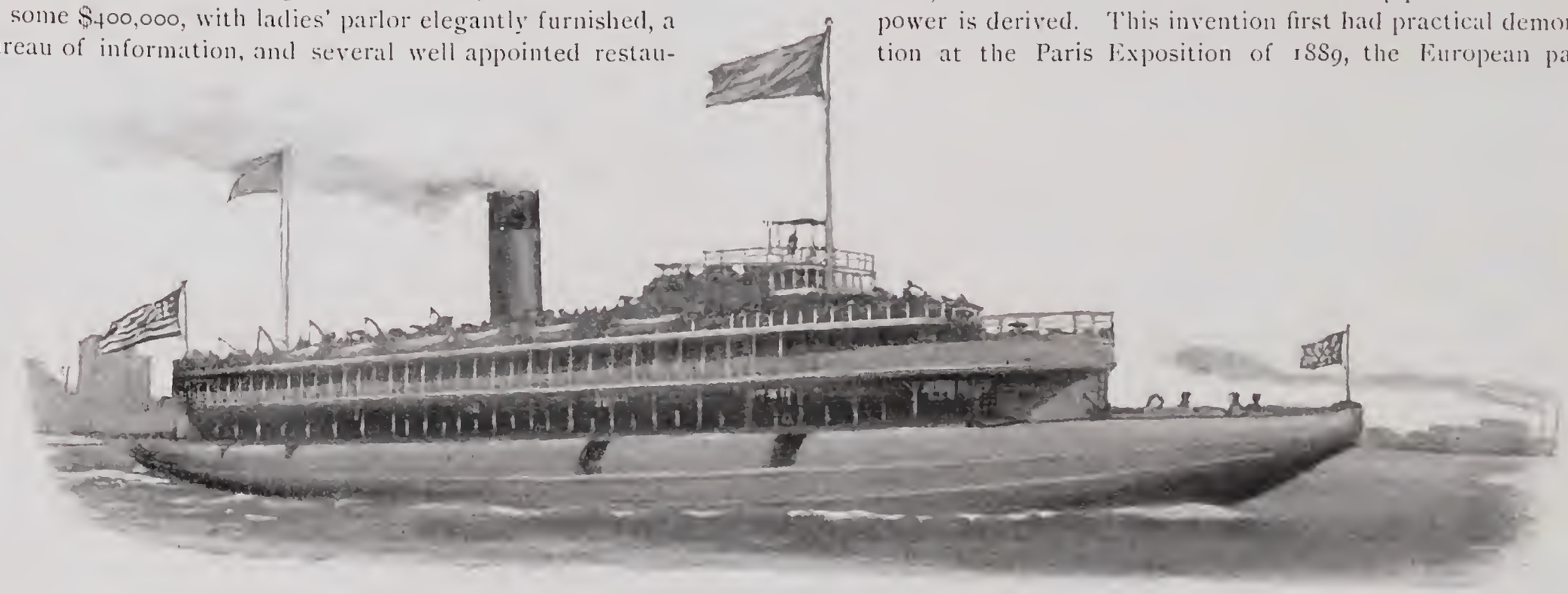
ON THE FRIEZE OF THE TRANSPORTATION BUILDING

World's Fair Miscellany.—In the Transportation department power was furnished by electricity or compressed air for the operation of machinery; but the use of steam was avoided as far as possible; nor were any lines of shafting erected within the building. As a precaution against accident, all exhibits of machinery in motion were enclosed by a railing.

Included in the railway division of this department is the terminal station, with its 30 lines of track, erected at a cost of some $400,000, with ladies' parlor elegantly furnished, a bureau of information, and several well appointed restaurants. A special feature is a series of 24 clocks placed upon the walls of its rotunda, whereby the visitor may ascertain the hour of day at as many of the great cities of the world. The clocks are regulated by United States observatory time.

The intramural or elevated electric road, operated within the Exposition grounds, is also included in this department. In its power plant are the great dynamo and engine described in the chapter on electricity. Its system is about six miles in length and the circuit is made in less than half an hour, affording an excellent view of the external features of the Exposition. The intramural road, it may here be stated, cost $1,000,000, and though carrying nearly 6,000,000 passengers during the term of the Fair resulted in a heavy loss.

Along the south side of the Midway plaisance is another elevated road, which is also considered as a portion of the Transportation department. Its cigar-shaped cars travel at a high rate of speed, being provided with runners or shoes, and propelled by turbine motors. Not only is water the motive power, with a pressure of about 150 pounds to the square inch, but the cars slide upon a film of water which issues from a small pipe behind each shoe. The rail covered by the water film is about eight inches wide, and beneath the track is the main pipe from which the power is derived. This invention first had practical demonstration at the Paris Exposition of 1889, the European patents



WHALEBACK STEAMER "CHRISTOPHER COLUMBUS"



MAIN DESIGN OF THE MACMONNIES FOUNTAIN

being controlled by Prince André Poniatowski, who claims that his system will work a revolution in the domain of transportation.

A much frequented portion in the marine division of the United States was that of the American Steam Barge company, of West Superior, Wisconsin, builders of the new style of steamer known as the Whaleback. When the first of the class appeared upon the lakes it was the subject of much ridicule, but soon it demonstrated its capacity for speed under all conditions of wind and weather. At the Fair the Whaleback representative was the *Christopher Columbus*, its steel cylinder-like body being more than 360 feet in length, tapering from the middle toward the bow and stern; and the ends of the cylinder lifting high out of the water like a birch-bark canoe. The vessel was lighted throughout with electricity and elegantly furnished, the grand saloon containing several fountains and large aquaria filled with lake fish. Besides conveying passengers from the city to the Exposition, the *Christopher Columbus* made several excursions to Milwaukee and neighboring ports, upon which occasions it proved itself the fastest boat on the lakes.



"WHITE STAR" PAVILION NEAR WOMAN'S BUILDING

By the World's Fair Steamship company 1,758,665 passengers were carried during the Exposition season, and almost as many by the steam and electric launches and gondolas plying on the water-ways within the grounds, the entire travel by water exceeding 3,000,000. No accidents were reported.

Scattered throughout the Transportation building are various exhibits of pneumatic tubes, overhead tracks, etc., designed for the conveyance of money and packages in large business establishments, and in the annex is pneumatic machinery for carrying grain.



INTRAMURAL ELECTRIC CARS



SECTION OF STATE ROOM "WHITE STAR" LINE

Elevators, whether in actual service or on exhibition, are included in the transportation department, some of them being run by steam, some by water and others by electricity. Among the miscellaneous exhibits installed in the annex may be mentioned the great steam shovels for dredging and the continuous chains of buckets for carrying water and semi-liquids. The largest steam shovel in the building, exhibited by a Bucyrus, Ohio, company, is used as a pavilion, and is well adapted to the purpose.

In the southeastern corner of the annex, and extending outside of it, is the exhibit of the Bay City Industrial works, of Michigan. The pavilion, which is within the building, is finished in light hard wood, and contains reception rooms for the public and private offices for the company, and upon the outer walls are photographs of the works at Bay City, and of the cranes, pile drivers, wrecking cars, and railway appliances manufactured by the company. In the out-door space are several massive pieces of hoisting apparatus used in the installation of exhibits. In this vicinity is also an exhibit of what are known as Pintsch gas buoys.

In addition to Siemens and Halske's exhibit of safety apparatus for railways, several American manufacturers show ingenious appliances of this description. The Johnson Railroad Signal company, of New Jersey, has a large pavilion constructed of the various apparatus employed in the Syke block system for grade crossings. Another company illustrates in a model a similar system in which no movable apparatus is located on the roadbed or other exposed place.

Near the lagoon, north of the Horticultural building, is the pavilion of the White Star Steamship line, reproducing, as far as possible, the outlines of an Atlantic steamer. It has two decks, with the familiar rail and netting, the latter hung with life buoys bearing the names of the company's fleet. Side lights take the place of windows, and on the decks are comfortable seats and chairs. The exterior coloring is of buff or cream and the gilded dome is surmounted by a five-pointed star and lighted by electricity at night. The interior affords an idea of the comforts and luxuries of the White Star service. In the centre are models, under glass, of its vessels, and near the main entrance a large chart showing the tracks of the company's fleet. Small models of the different boats are moved daily along their special routes, locating them approximately according to the reception of official reports.

On Transportation day, the 9th of September, a naval parade was held on the lagoon, in charge of A. C. Baker, superintendent of the marine division of the department. Modern yawls, Turkish craft, boats in the government service, Norwegian fishing smacks, Indian canoes, and craft from Ceylon, Egypt, Venice, Brazil, and other nations passed in picturesque review. Then came aquatic sports, and in the afternoon the agents of transportation by land were marshalled by J. G. Pangborn, secretary of the American exhibitors' association.



MOVABLE SIDEWALK AND PIER

There were brute and human carriers and vehicles of curious patterns, typical of many eras and nations. The engine *John Bull* was pressed into service, and many crowded into the old-fashioned coaches attached to it for a ride on the tracks of the terminal station, where these relics of early American railroads are on exhibition.

The operations of the Pullman Palace Car company were started, as I have said, in Chicago, and so rapid was the growth of its business that shops were soon afterward established in St Louis, Detroit, Elmira, and Wilmington. But even these could not keep pace with the demand, which could only be supplied by the erection of works on a larger and more comprehensive scale than any before attempted. Chicago, as the railroad centre of the continent, appeared to be the most suitable location; but to this there were weighty objections, which need not here be mentioned. Thus it was that George M. Pullman looked about him for a spot that would fulfil all the requirements of his constantly expanding business, and this he found near the shore of Lake Calumet, some fourteen miles from Chicago. Here he purchased a tract of 3,500 acres, now included within the city limits, whose suburbs are already encircling its borders. Such in brief is the origin of the town of Pullman, the most thriving of all our young western settlements, with its eight miles of paved streets, its handsome business blocks and residences, with modern appliances for comfort and sanitation, with churches, school-houses, and libraries, and a cosy theatre tastefully upholstered and equipped, all planned with symmetrical unity of design, amid stretches of lawn and park and bordered with flowers of brilliant hue, the home of one of the most prosperous and contented communities in the world, and the more so that it has not a drinking saloon within its limits. By the Palace Car company there is distributed in all nearly $150,000 a week as the wages of 15,000 employes; and of the 6,300 operatives engaged at its works at Pullman, a large proportion have homes of their own, while the Pullman Savings bank has $630,000 to the credit of 2,000 operatives. At these works there are used more than 50,000,000 feet of lumber and 85,000 tons of iron a year. At the construction shops there could be built, within a twelve-month, 12,520 freight cars, 313 sleeping cars, 626 passenger cars, and 939 street cars, which, if coupled together, would form a train 100 miles in length. The number of miles run by Pullman cars during the year ending July 31st, 1893, was 206,453,796, the longest unbroken run being from Boston to Los Angeles, California, a distance of 4,322 miles.

The 16th of September, the date on which the Manchester and Liverpool railway was opened sixty-three years before, was selected as railroad day by the Exposition authorities. Many prominent railroad men from the United States and foreign countries participated in the exercises and recreations, which included a trip on the intramural road, the movable sidewalk, and the historic pioneer train drawn by the *John Bull*, with a tug of war between an electric and a steam engine, the steam locomotive, though only an old switch engine, easily dragging its competitor along the track. The exercises, which were held in Festival hall, were largely attended, and included the usual feasting and speech-making.

On her westward trip the *John Bull*, with her two primitive coaches, left New York at 10 A. M. on the 17th of April, arriving at Chicago, after a triumphal procession, on the afternoon of April 22d. The engine was run as swiftly as its condition would allow with its wheezy boiler and rusty apparatus, followed by a special train of officials and journalists, and passing at times between throngs of enthusiastic spectators, waving hats and handkerchiefs as the time-worn relic went snorting past, with warning note of bell, resembling the sound of a dinner gong. The engine kept excellent time, though rumbling awkwardly over the rails and swaying to and fro like a vessel rolling in the trough of ocean. The tender is within two feet of the furnace door, and upon it is an odd-looking contrivance shaped like a poke bonnet, and called the gig top, where the forward brakeman sat, keeping a sharp lookout for other trains. The *John Bull* was driven by the same engineer who handled the locomotive forty-two years ago, and, as he said, "obeyed the lever as if her joints were not worn with age and stiff with rheumatism."

Of the Murdock engine, invented in 1784, as mentioned in the text, the following story is told in an English publication of many years ago. Murdock's experiments were conducted by night, near the Cornwall town of Redruth. Returning late from a visit to his flock, the pastor of this parish was suddenly confronted by a fire-breathing monster advancing furiously upon him. He sprang aside, and before the demon could turn upon him had run such a distance that, as it seemed, his fervid prayers for deliverance had been



MODEL OF PULLMAN



UPPER DECK STREET CAR



HOISTING THE KRUPP GUN FROM THE SHIP

answered. Still he ran, however, and presently came full butt against a man running in the opposite direction.

"Back! back!" he cried. "Run back for your life!"

"Have you seen my engine?" asked the other.

"I've seen the devil! Run! run!"

"How far away is he?"

The stranger's tone was somewhat reassuring; and bethinking him that he of all others should have courage to face the evil one, the worthy pastor turned back with his companion, who, it need not be said, was William Murdock. Soon they found the engine, which had run into a ditch, snorting and roaring in terrific fashion, and thence, to the astonishment of the parson, was dragged by its artificer.

Before being stationed among the exhibits of the New York Central railroad the engine *999* was attached to various trains to test her speed. On the 9th of May, while running on the Empire State express from New York to Buffalo, it is claimed that she made the last 69 miles in 68 minutes, making one of these miles in 35 seconds, and on another occasion, as mentioned in the text, a mile in 32 seconds. These figures are not official; and while there is no reliable evidence that this or any other locomotive ever ran at the rate of over 100 miles an hour, it is probable that the *999* has attained about the highest speed on record.

To test her speed and capabilities, the *Greater Britain*, sister engine to the *Queen Empress* in the London and North-Western company's section, was run for six days in succession between London and Carlisle, attached to some of the heaviest mail and express trains, their average weight, including engine and tender, exceeding 237 tons. The total distance travelled was 3,588 miles, and the time 75 hours and 17 minutes, or an average of nearly 48 miles an hour. The fastest runs were between London and Crewe, 158 miles in 3



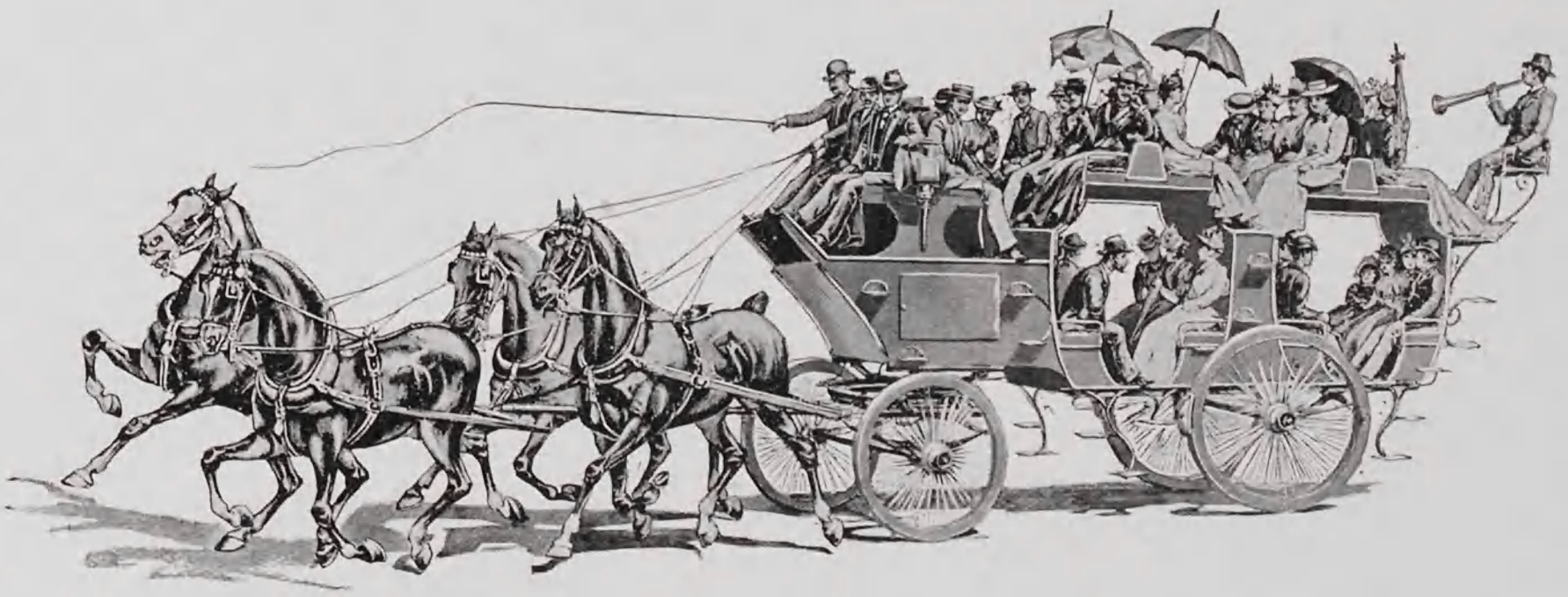
A NEAR VIEW OF THE MOVING SIDEWALK

hours and 8 minutes, or a little over 50 miles an hour. This is probably almost as good time as will be made by the Empire State express, when on regular service, notwithstanding the exaggerated accounts that have been published. Fifty miles an hour is in fact about the limit of speed, with due consideration to wear and tear of road-bed and rolling-stock.

Of the capture and recapture of the locomotive *General*, exhibited by the Nashville, Chattanooga and St Louis railroad, the following is briefly the story: Soon after the battle of Shiloh General Mitchell was laying his plans for the capture of the confederate stronghold at Chattanooga, and for that purpose it was necessary to cut off railway communication with Atlanta. The task was undertaken by Captain Andrews and a chosen band of federal scouts, their object being to capture a train on the Western and Atlantic line, and burn the bridges between Atlanta and Chattanooga. Disguised as Kentuckian farmers on their way to join the confederate cause, they reached Marietta early on the 12th of April, 1862, and there boarded the train for Chattanooga. At the next station the train stopped for breakfast, and there the attempt was made, though close at hand was a confederate camp, with sentries pacing to and fro. While the driver and conductor were taking their meal at the station, the raiders uncoupled all but the foremost car, and a moment later were speeding northward with their prize. Then followed "the great locomotive chase" which history records, Andrews and his men being hotly pursued and finally driven to the woods, where they were pursued with bloodhounds and captured, eight of them, including the captain, being executed as spies.



ELECTRIC BOAT IN PROCESS OF CONSTRUCTION





GENERAL VIEW ALONG THE WEST LAGOON



CHAPTER THE NINETEENTH

THE LIVE-STOCK DEPARTMENT



FOR the information of those who are interested in the Live-stock exhibits, a few remarks may be in place as to their origin and organization. Like all other features of the Fair, architectural, industrial, or artistic, there has here been a departure from the preconceived idea that anything intended to be a success must be absolutely controlled by a central head. The entire plan of the Columbian Exposition was itself a departure from this popular theory, and represents in all its branches the most advanced ideas of men possessed of the highest order of ability, directed to many phases of human endeavor.

In all previous live-stock exhibits in connection with international expositions, while many have been on an extensive scale, there were none that in quality or variety would bear comparison with the one held in Jackson park. For this the main reason is that the general scope of the display was outlined by the representatives of all the great live-stock associations of the United States, about seventy in number. When it was determined by the officials of the Fair to make live-stock one of its features, they solicited the coöperation of all the more prominent breeders, and with the result that these associations met in convention and a committee was formed to take charge of everything pertaining to the exhibit, its preliminary preparations, classification, premium lists, plans of buildings, and in a word to represent, in the discharge of its functions, the live-stock associations of the United States. From the beginning until the end, this committee has worked in perfect harmony with the Fair officials, and through their efforts it was brought about that a separate department was organized and a chief placed at its head. This segregation gave to it special prominence and had a marked effect upon foreign countries as well as

among the states. A special effort was made to secure coöperation with similar enterprises in Europe, through which the governments of European countries were brought into participation, for thus might they develop an increased demand for their stock. Especially were the Russian, the German, and French governments induced to make an elaborate display, not only bearing the entire expense, but offering large subsidies to exhibitors, though the Canadian government expended more money and made a larger exhibit than any of the foreign participants.

State exhibits were also stimulated by the appropriation of large amounts, and state pride as well as the emulation of exhibitors was encouraged to its fullest extent, Illinois heading the list in the contribution of funds



SECTION OF GRAND BASIN, WITH COLUMBUS QUADRIGA IN THE DISTANCE

and number of animals on exposition. Provision was made for showing about 3,000 animals at a time, first horses and cattle, then sheep and swine, followed by poultry. The highest types of the various breeds were collected; but surpassing all the rest was the display of horses, with thirty different breeds, all with established pedigrees, presented for inspection.

As an aggregation of all the principal breeds of live-stock in the civilized world, it is conceded that never before has this collection been approached. All that money and an appeal to the breeder's pride could do was done, and the result was a matchless display. The Russians sent their finest specimens, and, under the direction of the tzar, animals from his own stable were included in their collection, his brother, Count Demitry, also supplying a liberal quota. But the Germans entered into the competition more heartily than any European nation, a most energetic contest for the supremacy of the various German breeds making itself felt at an early date, and continuing unto the end. The largest number and one of the best collections were those of French blood, which numbered nearly one fourth of all the exhibit of horses. The next in number and quality were the British breeds, and without a doubt, the finest types of all countries were included in this exposition. One of the most significant features from the American breeders' point of view was the choice assortment of females, this meaning that the best species have been transplanted to American soil; so

that in future we shall not depend on foreign countries for the most useful and valuable varieties of live-stock.

Another feature in this department was the magnitude of the interests which it represented, the value of all farm animals in the United States being estimated in 1893 at $2,500,000,000, with 1,350,000 square miles of territory devoted solely to the raising of cattle, mustering at that date about 54,000,000 head. Of horses the number may be stated at 15,000,000; of mules, 2,500,000; of swine, 55,000,000, and of sheep, 47,000,000, with a wool clip of 300,000,000 pounds a year, and dairy products that find their way to market worth at least $15,000,000, while as to the value of such products raised for domestic consumption there are no reliable data.



TYPICAL AMERICAN-BRED STALLION

It is probable that our live-stock industries, as exemplified at the exhibition, exceeded in value those of all foreign participants combined. In Great Britain and Ireland, with half our population, the area available for pasturage is less than four per cent, and the number of animals, except for sheep, not more than fifteen per cent of the figures estimated for the United States. In France and Germany the number of farm animals may be stated at 50,000,000 for each, or about the same as in the British isles; Russia has perhaps twice as many, and adding to these a few millions for the dominion of Canada and other countries here represented, we have a total of some 260,000,000 against nearly 200,000,000 for the United States, the difference in number being more than compensated by a higher average of prices. Some of the largest stock-raising countries in the world sent no exhibits to the Fair, as the Australian colonies, the South American republics, and others whom distance debarred from participation.

Cattle farming has ever been a favorite pursuit in the United States, and in few industries have so many large fortunes been made, often on the smallest modicum of capital. While within recent years profits have been greatly curtailed by the encroachments of husbandry, coupled with drooping prices, the business is still of large proportions in all the more sparsely settled regions westward from the Mississippi river to the Pacific



READY FOR INSPECTION

ocean and southward from the upper Missouri to the gulf of Mexico. Vast herds and ranges are as numerous as ever, and especially on the Pacific coast, where single firms and individuals own 20,000 to 30,000 head, with lands of larger area than many a European principality.

As to breeds, the preference in money value is given to short-horns, a stock imported from England at least as early as 1785. But, as I have said, we no longer depend on foreign countries for this or any other variety of cattle. To-day the American short-horn has no superior, and not a few of our choicest animals have even been exported to Europe for breeding purposes. As beef cattle, for milking purposes, and for heavy farm work, they are much in favor, while also largely used for improving the grade of native stock. The Hereford is an excellent beef producer, and, as a milker, the Ayrshire ranks second only to the Alderney, the former being prized for cheese-making and the latter for the making of butter. So also with certain of the Dutch and Scotch breeds, the polled Angus and Galloway especially gaining in favor as among the hardiest of stock and the choicest of beeves and milkers.

Of horses the exhibit ranged from the hugest of draught animals to the smallest of Shetland ponies, with all the more prominent varieties valued for power or speed. The heavier draught-stock still consists largely of the offspring of English cart-horses, though greatly improved in breed. The Clydesdale is also a favorite animal, and for a strong and showy coach-horse the Cleveland bay is gaining in favor. The Norman, with his sturdy limbs and massive neck and shoulders, is valued for strength and endurance, especially the Percheron, in which is probably a tempering of Andalusian blood. The Conestoga, so called from its native home in the valley of that name, is supposed to be of German origin, and is the only variety peculiar to the



JUDGING THE CLYDESDALES

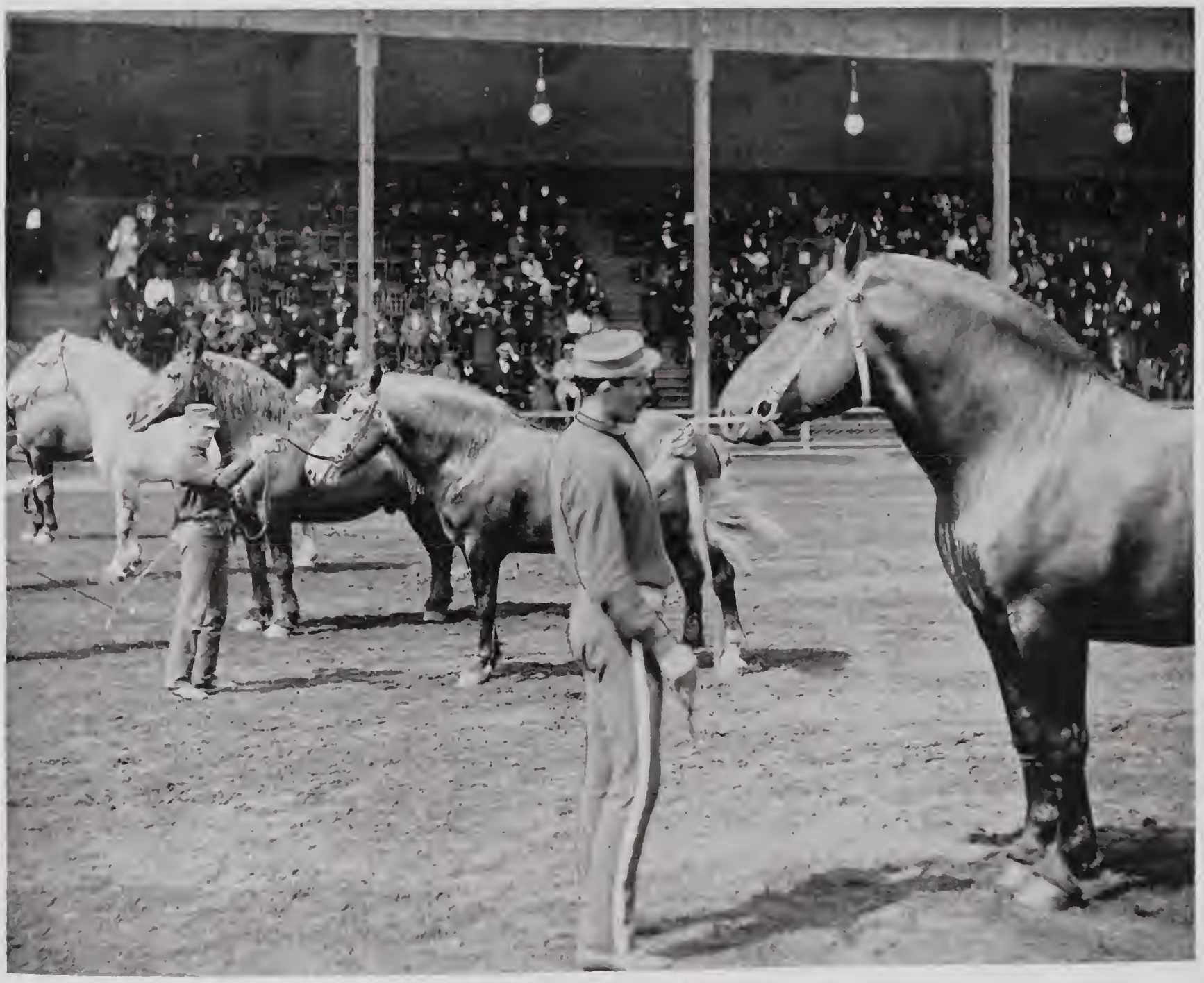


A TRIO OF CLYDESDALES

United States. It is a large and muscular animal, sometimes exceeding seventeen hands in height, and with the build of an English dray-horse, though lighter of limb and less encumbered with flesh.

The trotting-horse is the most distinctive of American breeds, with gait and pace unrivalled elsewhere in the world. Here is probably no particular strain, but rather the result of breeding from the choicest specimens and of constant practice on suitable roads and tracks. Certain it is that our best trotters have come from various stocks, as the Morgan, the Canadian, and the English thoroughbred; but all the best types are distinctly of home development, carried to a point with which there are none to compete. It is not many decades since a 2:40 horse first made his appearance on the turf; in 1870 a speed of 2:30 was almost unheard of, and when, a few years later, Maud S. covered her mile in 2:08¾ and her half mile in 1:03½, this record was the wonder of the sporting world. Yet it is predicted that among the wonders of the nineteenth century will be the trotting of a mile within two minutes or less.

As to the exhibits of sheep a word may also be said by way of introduction; for here is represented a most important branch of industry, especially in the far west, where alone can be had a natural food supply sufficient for extensive herding. The bunch and other grasses of the plains and foothills are excellent pasturage, and when cured as hay, will keep the flocks in good condition during the winter season. Alfalfa can also be profitably raised for the purpose, at least for the choicer breeds, while for the greater part of the year the sheep is self-supporting, eating that which no other animal will eat, clearing the ground of weeds, and otherwise serving as a scavenger.



AN ARRAY OF PERCHERON BEAUTIES

"England," it has been said, "is a mutton and the United States a wool country;" for the raising of a superior grade of wool does not consist with the production of finely

flavored meat. The merino, with its average fleece of four or five pounds and at times as much as a score of pounds, is here the favorite variety, and of this with its cross breeds consist at least 80 per cent of our flocks. The Southdown and Cotswold have been largely imported, more for their mutton than their wool, though the latter is of merchantable quality and with abundant clip. The Leicester is also valued for carcass and fleece, with wool of long staple but deficient in certain qualities. Among others are the Cheviot, Lincoln, Dorset, Shropshire, Hampshire, Spanish and Saxon merinos, the last from the original offspring of Spanish stock imported into Saxony as early as 1765. Except in Vermont, where perhaps are the choicest of American flocks, there are few whose blood is entirely pure, this not altogether the result of carelessness but at times with a view to combining the benefits of various strains. On the Pacific slope, where is more than one half our supply of sheep, Spanish, Australian, and American breeds have been blended with fair results, and here, until the progress of settlement absorbed the more valuable ranges, sheep-farming was the most steadily prosperous of all the western industries.



GERMAN COACH HORSES

For the conduct of the live-stock exhibit excellent regulations were framed by the chief of the Live-stock department. Exhibitors must have been the owners of animals intended for display for at least sixty days before the date of application, and must furnish a copy of the certificate issued by the association in whose register the animals were entered. Any misrepresentation would subject the exhibitor to the forfeiture of his rights and the exclusion of his exhibits. No vicious or fractious animals would be admitted, and all animals from foreign countries would be subject to quarantine regulations. Participants must furnish their own attendants, who would be required to obey the rules, to keep thoroughly clean the stalls and the grounds adjacent, under penalty of instant expulsion. A veterinary surgeon was appointed, whose duties included a thorough examination of the animals, before being admitted at the gates, with a daily inspection and report to the chief, the right being reserved to remove without notice all sick or dangerous beasts.

The Live-stock buildings are in the southern portion of the grounds, where a spacious tract is covered by a number of plainly constructed barns and by a circular pavilion somewhat resembling the colosseum. The latter lies south of the court of the obelisk, is 380 feet in length by 250 in width, and while not more than one third as large as its Roman prototype, is sufficiently commodious for the purposes for which it was designed. In the ten tiers of seats contained in the amphitheatre there is accommodation for 10,000 visitors, with access through four main entrances and eight smaller ones. The structure is roofed with iron, the show-ring being uncovered, and though of massive appearance, the grayish-white walls are of staff. Opening into the surrounding avenues are the offices of the live-stock commission and the headquarters of various journals which are organs of the agricultural classes. Here also is a bureau of information and a well appointed restaurant.



A PRIZE ANIMAL

The judges' stand was erected in the centre of the arena, their duties commencing after the animals had been exercised for two hours in the ring, the continual process of examining, judging, and the announcement of decisions being enlivened by music and tests of speed among horses of various breeds and nationalities.

Most of the sheep, hogs, and other small varieties of live-stock were examined by the judges within or near the barns reserved for them, the pavilion being specially built for the display of cattle and horses which

were driven to it almost daily from about the middle of August to the middle of September. On the 25th of the latter month swine and sheep entered the contest, occupying the barns which had been vacated by the larger animals. During the season poultry had also their day, while toward the end of October the leading breeders of the lighter grades of horses in the United States and Canada, comprising the thoroughbred, trotting, and coach varieties, organized an elaborate exhibition. Included in the display of horses were jacks and jennets, angora goats, of which there was a large collection, forming a class of themselves. Thus it will be seen that the Live-stock department, like several others of the Fair, was a shifting panorama, and is better described in the form of a narrative than in the present tense.



The first exhibits forwarded to Jackson park consisted of a band of Morgan horses and a herd of cattle from Vermont, these being followed soon afterward by Canadian thoroughbred horses and cattle, of which nearly sixty car-loads arrived in a single day. A week or two later there were on the ground 1,200 head of cattle and 800 horses. As to the extent and variety of the display, with the relative participation of states and nations, a brief description is afforded in the official statement reproduced in the note subjoined.[1]

The display of horses opened with a competition among those of the Suffolk Punch breed, so called from their compactness of form and from the English county where they have been raised for many centuries, though probably of Scandinavian origin. At one time this stock was coarse in form and slow of pace, but of late has been much improved, and nowhere more so than in the United States, now ranking among the most valuable of draft horses and one that takes kindly to the yoke. In this class the honors fell to Peter Hopley and company, of Lewis, Iowa, to whom were awarded 17 out of the 21 first premiums offered. Blazer was pronounced the best stallion of his breed, and Bragg the finest mare. In addition to money awards, gold medals and silver cups offered by American and British associations, were captured by this firm.



FROM THE IMPERIAL RUSSIAN STABLES

The exhibit of Suffolk Punch horses was followed by a choice display of French Percherons within the pavilion, and a brisk competition for honors. There was a large number of competitors, and the extent of territory from which the animals were drawn was very broad, embracing as it did Illinois, Minnesota, Wisconsin, Michigan, Iowa, Nebraska, and Canada. In the final division of honors, twelve first premiums fell to M. W. Dunham, his large contingent of Percherons coming from the Oaklawn farm, at Wayne, Illinois.

[1] LARGE BREEDS OF CATTLE: Shorthorns, 233; Herefords, 140; Aberdeen Angus, 72; Galloway, 78; Devon, 71; Holstein, 67; Red polls, 70; Polled-Durham, 30. SMALL BREEDS: Jersey, 243; Ayrshires, 129; Guernseys, 49; Brown Swiss, 54; Dutch belted, 16.

HORSES AND MULES: Clydesdales, 187; Percheron, 155; Suffolk Punch, 21; Shire, 49; French draft, 94; Belgian, 67; Arab, 6; American Arab, 17; Thoroughbred, 26; Cleveland bay, 48; French coach, 63; German coach, 92; Hackney, 32; Morgan, 66; jacks and mules, 49; saddle, 46; Standard trotter, 45; Russian trotter, 18; French trotter, 23, and Shetland pony, 85.

Of state and Canadian entries the following was the proportion. HORSES: Illinois, 220; Iowa, 137; Michigan, 75; Wisconsin, 74; Minnesota, 64; Canada, 55; Vermont, 50; Indiana, 46; Missouri, 42; New York, 39; Kentucky, 36; Nebraska, 18; Tennessee, 4; West Virginia, 3, and one each from Ohio, North Dakota, Kansas, and Pennsylvania.

CATTLE: Canada, 234; Illinois, 172; Minnesota, 154; Ohio, 99; Missouri, 83; Indiana, 78; New York, 67; Pennsylvania, 59; Iowa, 59; Vermont, 49; Kansas, 42; Nebraska, 42; Kentucky, 33; Michigan, 17; Maine, 13; North Dakota, 10; Massachusetts, 1.

His stallion, La Ferte, was the winner of the first prize, strengthening the position reached some years before, when in competition with the Clydesdale and Shire breeds, he won the championship as the best draft stallion of any variety.

In the above competition it was observed that Minnesota received many of the second premiums, and at the ensuing tests between Clydesdales this state was *facile princeps*. Many of the first premiums fell to N. P. Clark, of St Cloud, and included those for the best stallion bred in Scotland, the most valuable mare bred in Scotland or America, and the finest of either sex upon the grounds. His strongest competitor was Robert Halloway, of Alexis, Illinois, who, besides taking several first premiums, was adjudged to possess the most valuable stallion bred in America, the prize being given by the Clydesdale society of Great Britain and Ireland.



That Shires and French draft horses thrive well on the prairies of Illinois was evident from the appearance of the animals which next entered the arena. With few exceptions they were raised in that state, the draft horses from the Oaklawn farm showing that here was as successful a breeding ground for this class as for the Percherons, while Burgess brothers, of Wenona, took the prize as Shire breeders. The Shire, it may be remarked, is the largest and most powerful of all English horses, claiming as his progenitor the mail-clad war-horse of ancient times. He is now used for the heaviest kinds of work, as for ploughing, and hauling such cumbersome articles as steam-engines, threshing-machines and brewers' drays. His Scotch brother, the Clydesdale, is nearly as large, and though somewhat quicker in action, is mainly used as a cart or dray-horse.



SHETLAND PONIES OF IOWA

On a special occasion Clydesdale, Shire, Percheron, French draft, and Belgian horses were in the ring at one time, with Russian horses driven under saddle, and Shetland ponies, single, double, tandem, four-in-hand, and four abreast, thus bringing home to spectators that even in the matter of live-stock they were attending a world's fair. The cosmopolitan nature of the exhibit was further emphasized by the appearance of several beautiful animals of the Arabian



A TENNESSEE TWO-YEAR OLD

and American-Arabian breeds, for which three of the exhibitors had won the highest premiums, Jacob Keyl, of Milwaukee, for both classes, M. W. Dunham, of Wayne, Illinois, and J. B. Hall, of Toronto, Canada, for those of mixed breeds. This was considered Iowa's special day, the state band furnishing the music, the state itself supplying nearly all the Belgian horses, so much admired, while to Van Volson brothers and A. B. Holbert, of Greeley, fell the honors awarded to Iowa's exhibits.

A few days later, W. J. Buchanan, the chief of the Agricultural and Live-stock departments, marshalled the prize-winners and those who were still to be honored, for a parade through the Exposition grounds. Moving from the stock pavilion, a detachment of Columbian guards was followed by the Iowa state band, and by the chief in person, driving a noble looking animal. Behind him came a string of tiny Shetland ponies, whose reins



ROY WILKES, A FAMOUS AMERICAN STALLION

were held by boys and girls, followed by Russian horses, American riding horses, German and French coach-horses, native and French trotters, Morgans from Vermont, Arabian steeds, Clydesdales, Percherons, French draft, Shires, Belgian, and Suffolk Punch horses. Most of them were led by grooms in native costume, and where honors had been awarded, the bright premium ribbons fluttered from their heads—blue for first prizes and red for the second. Thus 600 of the finest animals ever gathered together passed through the principal avenues of Jackson park between serried lines of spectators, and here was in truth a collection, culled from every quarter of the world, which taken in its entirety has never before been equalled in the annals of show-yard exhibitions.

The closing days of September were mainly devoted to the famous English breed of Cleveland bays and the coach-horses of France and Germany. The coaching horse of England and the Cleveland bay are almost identical, and now are used for the plough, for heavy carriages, and for slow driving. In the latter class most of the entries were by Illinois breeders, who captured nearly all the first and second premiums, the majority of the prizes falling to Stericker brothers, of Springfield, and George E. Brown, of Aurora. As to the French coach-horses, the most extensive exhibit was made by the Oaklawn farm of Illinois, the competition increasing the number of its prize animals to a total of 111. Its entries of Percheron and French coach-horses mustered in all 500, the animals which were exhibited in a special building forming an additional attraction.

Alluding to the entire exhibit of French coach-horses, the judges make the following remark in their report to the bureau of awards: "Surely the grand and unequalled specimens of the equine family found in this department were all the most enthusiastic admirers of the breed could desire or hope for." In this exhibit no less than 68 animals came from the Oaklawn farm, and to these were allotted 49 first prizes, including sweepstakes and awards of honor, five of them being also winners of first prizes at the Paris Exposition of 1889. Among the latter was the chestnut stallion, Indre, who in the front rank of the parade attracted general attention by his stately carriage and bold, powerful step. So also with the bay stallion, Perfection, a carriage horse of remarkable beauty, with long but graceful curve of neck, lofty bearing, easy movement, and form as powerful as supple. In his offspring, descended through ten generations of ancestors without a flaw in pedigree, was also noticed his own tenseness of nervous organization. Other first prize stallions were Lord, a four year old bay; Urban, a two year old chestnut of perfect symmetry, style, and action, and Monaco, a two year old bay, with all the force and more than the stature of his sire, Indre. In the second line was the black stallion, Aguadel, a rival of Indre in the class of aged French trotters, and with him a number of mares and of colts and fillies of which 23 prize-winners were sired by Indre and Perfection.



SECTIONAL VIEW OF AGRICULTURAL BUILDING

"There was substantially no contest between French breeders of these famous stocks and American breeders of the varieties originally imported. Of German coach-horses, however, there were many exhibitors from the Fatherland, as well as from Illinois and Iowa. The final result was an almost even division of the honors among the three chief contestants, the advantage, if anything, lying with foreign participants. Ulfert Poppen, of German valley, Illinois, was one of the most successful, and many of the competitors from that state or from Iowa were of his nationality. Thus, while the stock bred on German soil may have had slightly the advantage as to ribbons of honor, it was, in the main, a contest restricted to a single nationality.

The competition among the coach-horses of English, French, and German breeds was concluded during the month of September, after which a week was set apart for hackneys and Morgans, jacks, jennets, and mules, saddle-horses, Russian and French trotters, and Shetland ponies. When all was over, it was decided that the best hackneys were those from Nebraska and Canada, and that Vermont and Kentucky breeders excelled in the Morgan class, but with Illinois and Indiana not far behind. As to mules, jacks, and jennets, the result was in favor of Missouri, though abundant honors were also bestowed on Illinois, Kentucky, and Tennessee.



GROUP IN PLASTER NEAR GONDOLA LANDING

Among Russian trotters the tzar's horses had no worthy competitors, while Dunham once more gathered all the premiums for his French breeds. The picturesque features of the show were furnished by the saddle-horses and Shetland ponies. As the former were put through all their paces, the live-stock arena was converted into a circus ring, the contest

being intensified by the forthcoming prize, to be presented by Chief Buchanan himself, in the form of a handsome silver cup. The trophy was awarded to J. T. Crenshaw, of Todd's Point, Kentucky, "Monte Cristo Junior" being the name of the steed.

To children the exhibit of Shetland ponies was one of the most attractive features of the Fair, as also was the group of tents containing a band of Wisconsin ponies. Among the former, about fifty in number, were colts and weanlings, some of them not more than twenty pounds in weight, but "ready," as one of the exhibitors remarked, "to grow up with the children and become useful and companionable." The animals were broken to saddle and harness, the latter either as singles, spans, tandems, or four-in-hands, and beside them was an assortment of pony carts, with equipments to match. The largest groups were from the Pittsford farms, New York, and from Maquoketa, Iowa, the former displayed by E. F. Hawley and the latter by J. M. Hoag. It was in fact the east pitted against the west, and if the children could have had their way, every pony that entered the lists would have received a ribbon; but the judge was obdurate, awarding one first premium and six of the minor class to the New York collection, with blue ribbons to the stallions of Robert Lilburn, of Emerald grove, Wisconsin, and a mare owned by G. A. Watkins, of Detroit, Michigan. The Shetland and Wisconsin pony shows closed the main series of competitions in horse flesh.



GALLOWAY COW

One of the most noted stallions on exhibition was Roy Wilkes, whose record in turf annals consists of one continuous series of victories over such horses as Mascot, 2:04; Guy, 2:06¾, Manager, 2:06¾; Major Wonder, 2:09¼; Riley Medium, 2:10½; Grant's Abdallah, 2:10¼; Dallas, 2:11½, and Brown Hal, 2:12. He not only captured the first premium for stallions of five years and over, but holds the world's record, 2:06½; for stallions in a class race, without a runner to prompt. Roy Wilkes has earned the world's stallion record, 2:08¼; the world's record to a wagon, 2:13; the world's record for ¼ mile, 27¾ seconds and the two fastest heats in a race for a stallion, 2:06½ and 2:08¼. It is, furthermore, a noteworthy fact that a veterinary surgeon representing the Government department was sent to secure measurements of the animal, and after thoroughly doing his work pronounced the animal a perfect type of the American trotter. Naturally, therefore, the progeny of Roy Wilkes, both pacers and trotters, have shown remarkable speed. The home of this animal is at the Calumet stock farm, in the neighborhood of Geneva, Illinois, and it is described by an admirer "as a dapple seal brown of the richest color imaginable, his coat being as glossy as the finest satin. In height he is 15¾ hands and weighs in the neighborhood of 1,200 pounds, in bodily conformation reminding one of old George Wilkes. He has a massive neck nicely cut up at the jowl, built on the Patchen line; but there is the broad breast, barrel perfectly ribbed up, shoulders sloping to suit the most fastidious, a back second to none on any race horse, indicating strength par excellence, and the legs of the Wilkes, with wide, flat bone, braced with muscles at every point. His hocks are simply perfection; he has a fine head, perfect



PRIZE BULL AND COW OF JERSEY BREED

muzzle, bright intelligent eyes, a pair of well shaped ears of medium length, and is of the most kindly disposition. Noticeable points in his make-up are his mane and tail, the latter being a waving mass as black as ebony and sweeping the ground. In fact, there is no white upon the entire body except a faint star upon the forehead."

As to the cattle show it will be seen by reference to the official list already quoted that the display of Canadian cattle was much more extensive than that of any of the states, and, as will presently appear, the dominion was rewarded with a large proportion of the highest premiums. The result was the more gratifying to our neighbors beyond the lakes, since nearly all the breeds selected for competition were of British types. Leading the list, in the order of the series, was the shorthorn, the best of English breeds, and one adapted to all climes and countries. Next was the red and white Hereford, docile and easily fattened, followed by the hornless Scotch breeds, the Aberdeen-Angus, and the Galloway. The Jersey and her more homely and larger sister, the Guernsey, showed their best points, and between these exhibits came the famous Holstein-Friesian, of Germany. The well-built Devon, whose production of juicy beef from the scant lands of her native shire is one of the mysteries of nature, was also represented, with the Scottish Ayrshire, famed as a cheese maker. Then there were red polled cattle and polled Durham, hornless as their names imply, with the Dutch belted and the small brown beauties of Switzerland, both suggestive of the dairy house and the cheese press. The tests conducted throughout the Exposition season for determining the value of different breeds for dairy purposes were under the supervision of a separate bureau, and have already been described in connection with the Dairy department.



SEGMENT OF THE CATTLE RING

The exhibition of shorthorns aroused general interest among breeders, Kentucky, Missouri, Indiana, Minnesota, Illinois, and Ontario, Canada, having each a large number of participants. The first premium for the best bull, without regard to age was awarded to T. S. Moberly, of Richmond, Kentucky, whose "Abbottsburn" was pronounced the king of shorthorns. The same breeder took the first prize for the finest two or three year old heifer; but the best herd was pronounced to be that of H. F. Brown, of Minneapolis, Minnesota, the first premium for cows going to J. G. Robbins and son, of Horace, Indiana. For the most valuable young herd, consisting of one bull and four heifers, all under two years, the first prize was taken by J. and W. Russell, Richmond Hill, Ontario, and for the best cow of any age by J. G. Robbins and sons, of Horace, Indiana.



CHAMPION BULL, TWO YEARS OLD

"Ancient Breton," the property of H. H. Clough, of Elyria, Ohio, was the first prize-winner among the Herefords, while the blue ribbon for the queen of this breed was awarded to "Annabel," owned by W. S. Van Natta, of Fowler, Indiana. In the contest for the most valuable herds, Ohio and Missouri exhibitors were successful, Clough again receiving the highest honors, together with Gudgell and Simpson, of Independence. When the time came for the Scotch breeds of Galloways and Aberdeen-Angus, it was evident that Indiana, Minnesota, and Ontario were to be prominent in the former, and Missouri, Illinois, and Iowa in the latter. In the Aberdeen-Angus competition most of the first premiums were awarded to Wallace Estill, of Estill, Missouri, and for Galloways to the Brookside farm at Fort Wayne, Indiana, and Hugh Paul, of Dundee, Minnesota. Ontario breeders took a number of minor prizes, those of the first class falling to William Kough, of Owen Sound.

Thus ended the competition between the various breeds of beef cattle, dairy animals being next in order, and first among them, Jerseys. In this class entries were numerous from Missouri, Illinois, and Minnesota;

but, as a rule, the highest premiums were awarded to Pennsylvania and New York. The herd of Jerseys exhibited by T. S. Cooper, of Lehigh county, Pennsylvania, was of excellent quality, taking fully one half of the many premiums offered, the prize for the best cow falling to C. A. Sweet, of Buffalo, New York. Eastern participants also carried away the majority of the honors in the Holstein-Friesian class, especially those from the empire state, the sweepstakes for the best bull going to D. F. Wilber, of Oneonta, New York; for the best cow to C. V. Seeley, North Farmington, Michigan.



THE DAIRY BUILDING

The cattle show closed with the competition among other English and Scotch breeds and the Dutch belted and Brown Swiss cattle for the grand sweepstakes to be awarded according to age and for general merit. Canadian exhibitors were made glad when the premiums were allotted for Devon and Ayrshire cattle, sweeping all before them in the latter class, with Daniel Drummond, of Montreal, as the largest prize winner. For red polled cattle Iowa was in the front, many of the exhibitors coming from that state and nearly all the first premiums falling to J. H. Gilfillan, of Maquoketa. In Dutch belted cattle Pennsylvania was at the head, represented especially by H. B. Richards, of Easton, while all but one of the fifteen premiums for the Brown Swiss breed fell to Abraham Bourquin, of Nokomis, Illinois.

The last days of the cattle show were enlivened by a grand display in the ring of all the cattle exhibited, and a special parade of Canadian stock, the season concluding with the general competition. The sweepstakes for the best herd of beeves was taken by J. G. Robbins, of Horace, Indiana.



Sheep and swine were on exhibition from September 25th to October 13th, about 3,000 head of both being entered. For the best sheep awards were made to exhibitors of Cotswold, Leicester, Lincoln, Cheviot, Dorset, Southdown, Shropshire, Oxford, Hampshire, and merinos, in the order named, Angora goats being also included in these classes. The largest number of entries was of merinos, delaine-merinos, Southdowns, and Oxfords. Ohio, Missouri, Michigan, Illinois, and Vermont took most of the premiums for delaines and merinos, Ontario presenting an excellent display of such English breeds as Lincolns and Southdowns. John Jackson and sons, of Abingdon, were the prize-winners in the latter class, and in the group of Angora goats, as also in the special class of Persian or Astrakhan sheep, C. P. Bailey, of San José, California, won the first and second premiums in all the sections. These beautiful animals shared a building with a large flock of Cotswold sheep, exhibited by a Wisconsin breeder, who captured a number of prizes.



WITHIN THE LIVE-STOCK PAVILION



LOOKING UP THE NORTH CANAL



A MONSTROUS PRIZE WINNER

New York exhibitor came the only considerable flock of Cheviots, representatives of the hardy breeds which flourish in the lowlands of Scotland, another participant from the empire state showing several fine specimens of Pomeranian merinos, owned by Baron von Homeyer. Much interest was aroused by the competition for honors among the different breeds of rams, for which a number of valuable prizes were awarded.

Berkshires, Poland Chinas, Chester whites, Duroc-Jerseys, small Yorkshires, and the Essex, Victoria, and Cheshire breeds were the varieties of swine exhibited, premiums being awarded simultaneously with those for sheep. In the



LARGEST STEER IN THE WORLD



DUTCH BELTED BULL

Among the noticeable exhibits of the Shropshire breed was the one made by A. O. Fox, of Oregon, Wisconsin, whose ram, "Kingstone," weighing 350 pounds, took the first prize as the largest yearling on the grounds. Across the way, in the Ontario section, was Newton Lord, a famous Shropshire ram, the English and Canadian prize-winner in former contests, and now the champion of the United States. In another building were the Oxfords, from the Summer Hill stock farm of Peter Arkell, of Teeswater, Ontario, who claims to be the first American importer of this stock. From a swine division Ohio, Illinois, Indiana, Iowa, and Nebraska were prominent. A famous character among the Poland Chinas was "Black Wilkes," the prize-winning boar, weighing 800 pounds, but as spry as a yearling. He is owned by Taft and company, of Humboldt, Iowa, and has a long list of celebrated ancestors. The comparatively modern breed of Duroc-Jerseys was well represented, J. M. Stonebraker, of Panola, Illinois, the pioneer raiser of this stock, exhibiting among his herd the boar "Exchanger," now famous throughout the country. His weight is 900 pounds, notwithstanding which he is said to be light of foot.

The last two weeks of the Fair were devoted to the display of fat stock and

light draft horses. Although breeders were not debarred from the latter competition, it was specially designed for individual owners of fine horses. Standard trotters, thoroughbreds, horses and ponies in harness, with equipages, comprised the exhibition, which continued for nearly a week. Entries were made from Illinois, Indiana, Minnesota, Iowa, Michigan, Missouri, Kentucky, Tennessee, and Ontario, and among the breeds represented were Morgans, Arabs, American-Arabs, French, German, and English coach-horses, and trotters of the French and American classes. Medals and diplomas were given for points of excellence in animals, for equipage and appointments, and for skill in driving, and when the contest was for horses in harness, the prizes were divided as thus indicated, 50 per cent being allowed for the highest premium for the horse, and 25 per cent each for equipage and driving. Horses were driven singly, tandem, in pairs, three abreast, and four-in-hand, and yoked to broughams, phaetons, and such heavy vehicles as coaches and tally-hos. There were also special prizes, as for the most skilful lady driver and for the best appointed park tandem.



A COTSWOLD BEAUTY

The fat-stock show comprised such breeds of cattle as short-horns, Herefords, Aberdeen-Angus, and Devons, premiums being given for the best of these breeds, for the heaviest steers, the best working oxen, and the finest herds. In this group were also Poland China, Berkshire, Essex, Duroc-Jersey, Yorkshire, and Victoria swine, with sheep of the Lincoln, Leicester, Hampshire, Cotswold, Southdown, merino and Shropshire grades. As in the competitions for dairy and breeding purposes, held earlier in the season, the cattle were judged in the Live-stock pavilion. In this connection also may be mentioned the trained cattle, displayed in the arena by a Connecticut owner, which, under the names of Jim and Tim, Jerry *and Terry, delighted thousands of spectators while* the monotonous work progressed of deciding upon the premiums.

Chicago is famous for her draft horses, and her merchants, manufacturers, and express companies combined to make an exhibit of animals, harness, carriages, wagons, and trucks whose equal has not before been seen in the United States. Clydesdales, Percherons, Belgians, Normans, and other breeds were represented, the attendance indicating that cart-horse shows, so popular in England, had obtained a foothold in this country. During the forenoon of the 27th all the horses and wagons were registered at the stock pavilion, and after



OF THE CHEVIOT BREED



SPECIMEN OF SOUTHDOWN STOCK

the usual parade, returned there to be judged. Premiums were awarded on such points as the soundness and serviceableness of the animal; construction and adaptability of the vehicle and harness; general condition of animal, vehicle, and harness, as an indication of stable management; skill of the driver and tractability of the horse. Swift and company received the first premium for the most valuable six-horse team; Marshall Field and company for the best team of four horses; W. M. Hoyt for three-horse team; Swift and company for two-horse, and Gage, Downs and company for single horse equipage. For the finest wagons, the highest premiums were awarded to Swift and company and the American Express company.

"Do you know that the United States government statistics show the annual value of the



A PRODUCER OF FINE MERINO WOOL

poultry product of this country to be more than that of either wheat, cotton, or dairy articles?" Such was the question put by a manufacturer of chicken incubators; but as the query is in the nature of an assertion, it may serve as an explanation of the widespread interest manifested in the poultry exhibit. As the raising of fowls requires but a small capital, and the returns are quick, thousands have invested in this branch of industry, and especially many of the female sex. Thus, although poultry were not formally displayed until during the last month of the Fair, the buildings which contained them were usually filled with visitors and inquirers. While the business has assumed large proportions in some sections of the west, it was from the eastern and middle states that most of the exhibitors came, especially those who make a specialty of fancy breeding. The display was on a much larger scale than at state and county fairs, and though containing no special novelties, was by no means devoid of interest. Here, for instance, one might compare the diminutive bantams, some of them weighing less than a pound, with the Brahmas, Shanghais and other Cochins, any one of which would outweigh a score of its tiny neighbors. White and brown Leghorns, black Minorcas, and many Spanish varieties were also on exposition, as well as Hamburgs, Dorkings, and Plymouth Rocks, the two last especially typical of England and the United States. France had also her contingents in the Houdan and Creve-cœur breeds, and Poland in her silver, golden, and white-crested specimens. Each exhibitor was restricted to four birds; but there were more than 4,000 entries in the different classes, representing a score of states, the dominion of Canada, and the republic of France. In point of numbers Plymouth Rocks led the list, followed by Brahmas, Polish of various strains, and Houdans, while of the participants Canada, New York, Ohio, Illinois, and Missouri were the most prominent.



THE OXFORD BREED

Exhibitors both from the east and west were eager to explain their methods of hatching and raising, showing, as they asserted, the advantages of artificial incubation over the process which nature has provided. For a complete exposition of this phase of the subject the visitor was enabled to examine, in a separate building, a large array of apparatus representing manufacturers in Connecticut, Ohio, Illinois, Iowa, and other states. Here the champions of artificial breeding claimed that the chickens hatched by machinery were not only larger and better at every stage of growth than those cared for by the mother hen, but developed into finer fowls and took the premiums at all the important fairs in the United States. At an early stage of the controversy, they said, every one admitted that the artificial method was best for the raising of market poultry; but it was asserted on the other side that the male birds must be hatched by hens. When this theory was swept away at local exhibitions by the production of prize roosters hatched by the machine process, then, as the manufacturers would have us believe, the fancy fowl breeders adopted their incubators in a body; and now, throughout the eastern states, poultry raising has become an immense industry, prosecuted almost entirely by the inanimate hatcher and breeder. One of the



DORSET HORNED SHEEP



BROWN BESSIE, A PRIZE WINNER OF THE JERSEY BREED

strongest arguments in its favor is that the vital powers of the hen, overtaxed by sitting, are reserved for laying.

The incubators here displayed were heated either by hot water or air, the electric machine being installed in its proper department and described in the chapter on Electricity. In the incubators of a Springfield, Ohio, firm the hot water circulated through a galvanized iron tank; a vulcanized rubber bar was placed in a chamber just above the eggs, and when it became expanded by heat, the flame of the lamp was cut off through the lifting of a lever upon which the bar operated. When the temperature fell so as to contract the bar, the lever was lowered and the heat again admitted. Most of the machines were supplied with ingeniously contrived thermostats, or heat regulators, an Iowa patentee furnishing a device by which the trays of eggs could be instantly turned without opening the machine. To prove the validity of their claims, several manufacturers had their apparatus in practical operation, the broods of chicks running around their incubators of iron and wood as lively as though they had never known any other parentage.

In the poultry division were also included carriers, pouters, tumblers, trumpeters, homers, and other varieties of pigeons, Canada being as prominent in exhibits of this class as in others. An entire barn was set apart for the purpose, and in another were housed the turkeys, ducks, geese, rabbits, ferrets, and miscellaneous pets.



MARY MOIDEN, A PRIZE JERSEY COW

In conclusion it may be said that the exhibition of live-stock in all its departments, and especially of horses and horned cattle, was the best that was ever witnessed in the United States, and probably the best in the world. Nor could it well be otherwise considering the general interest aroused by the efforts of the committee in every section of the republic, in Canada, and in the principal stock-raising countries of Europe. It was in truth an international feature of an international exposition, and though perhaps somewhat of an innovation, could not have been omitted from a display in which all branches of human enterprise were to be represented; for this, as we have seen, is an industry of vast proportions, and one to whose further development there is no apparent limit.



LILLY (SIGNAL) FLAG, A PRIZE ANIMAL



"SACRED COW" FROM THE WEST INDIES

WORLD'S FAIR MISCELLANY.—As stated, the live-stock exhibition did not open until August, but the pavilion was too desirable a spot to be overlooked by those who wished to give entertainments requiring considerable space. From July 4th until the formal opening of the department the English military tournament furnished exhibitions of athletic and manly feats, comprising wonders of marksmanship



RUSSIAN HORSE AND RIDER

and horsemanship. Upon their departure for Canada, two of the members of the company, Major James Lee and Corporal J. H. Evans, of the Life-guards, were presented with a gold watch and a gold medal, the former because of his skill in tent-pegging, and the latter for bravery at the fire in the Cold Storage building, on July 10th, described in a previous chapter.

A notable occasion was the wand drill of July 26th, in which nearly 3,000 turners participated. Through some misunderstanding on the part of the management, the pavilion was still occupied by the military athletes, who at first refused to evacuate it. For a time, a riot seemed imminent; for a large crowd had collected anxious to witness the drill of the Germans. A company of Columbian guards was summoned, but the difficulty was finally adjusted, and the turners, headed by a squad of fencers, 100 strong, entered the arena. Then came a phalanx of color-bearers, and the sturdy column of the regular force, each member of which bore a burnished iron wand. The evolutions which followed constituted a wonderful exhibition of discipline, strength, and agility, the exercises of the turners as a body being supplemented by gymnastic feats, while a club from Davenport, Iowa, gave an exhibition drill in which the participants were equally divided as to sex.

The live-stock arena was the scene of several games of football, contested during the last two months of the Exposition season. Perhaps none excited more general interest than the one between a team of West Point cadets and the Chicago Athletic club, the latter winning a decisive victory. It was asserted by their opponents, probably with truth, that they would have made a much better fight had not the social dissipations in which they indulged while in Chicago unfitted them for such sport.

It may be added that the pavilion was also the scene of a contest not authorized by any one in power, and which constituted one of the few lawless acts of a serious nature perpetrated within the limits of the Exposition grounds. Just before the close of the English tournament and the opening of the live-stock department, a British bugler and an Irish carriage washer fought a brutal prize-fight, the Englishman worsting his foe and receiving $500 for his pains. The council of administration attempted to bring home the culpability for apparent negligence or connivance on the part of guards and police; but the result of the investigation was not made public.

In the building mentioned as containing various apparatus for the artificial raising of poultry, was a large exhibit of prepared foods for all kinds of live-stock. One kind is said both to prevent and cure chicken cholera, regulate and stimulate the laying of eggs by hen, turkey, or goose, and to be especially healthful for very young chicks. The exhibitors also manufacture a preparation for horses and cattle. One firm produced a feed made of corn from which the free starch had been extracted, stating that the animals on which it is fed become fat and sleek. Another showed a compound of seeds, roots, and herbs, to mix with the regular feed of cattle, sheep, and hogs, believing that variety of food is good for the animal as for the human race. Ground linseed cake, or linseed meal, was displayed in various forms, by several manufacturers, as a safe and nutritious pabulum for horses and cattle, especially for dairy animals. After the flaxseed is ground and subjected to a high temperature, the oil is extracted by hydraulic pressure, and the residue, or linseed cake, is ground into meal. The difference in the process of manufacturing the oil determines the comparative value of the meal as feed for live-stock, a Cleveland company, for instance, holding that by its method the cake was left with an unusually large percentage of nitrogen, a most necessary element in the food of dairy breeds. But whatever the comparative merits of the different preparations, it is interesting to learn that in the United States, and especially the west, there is an increasing demand for linseed feed. Until recent years the mills of this country turned out about one third of the world's production, nearly all of which was exported to Great Britain. Now about 400,000 tons a year are manufactured in the United States; 550,000 in England, and 200,000 on the continent of Europe.

A bull four years old and a cow of two represented the live-stock of the West Indies. They were as delicate as Jerseys, the bull being mouse-colored and the cow of a rich creamy hue; but their peculiarity was the hump between the shoulders. The specimens



RUSSIAN HORSE

were brought from Trinidad, where they are used for light-draft purposes, being fast and not ungraceful trotters. About a dozen years ago the original stock was imported from Hindostan, and has since been crossed with that of native cattle.

Illinois, Iowa, Vermont, Minnesota, and the Canadian provinces of Ontario and Quebec appropriated money for the expenses of their



DRAFT HORSE

live-stock exhibits. The awards included medals and money from the Exposition authorities and special premiums from associations. Altogether the management had guaranteed a distribution of $150,000 among all the classes of exhibitors, including several sweepstake prizes for the best herds of cattle. Some of the states also voted large sums to be given to their successful competitors. Missouri showed special liberality in this regard, her state commission appropriating $20,000 for the purpose. A premium of $200 was given for each Missouri cow that captured a prize in the dairy breed contest, and half that amount for every one finally chosen by experts to be exhibited. Missouri well sustained her reputation as a leading producer not only of cattle, but of draft and trotting horses, mules, merino sheep, and Berkshire and Poland China swine. On Missouri day, August 30th, there was a special parade of the cattle contributed by that state, attended by Governor Stone and several public officials. In September, in addition to general parades of live-stock, there was a procession of nearly 800 horses, which, on passing the New York state building, was reviewed by Governor Flower, Chauncey M. Depew, and other prominent men from the empire state.

From several states were entered for competition specimens of the Morgan breed of horses, which ante-date the variety known as the standard American trotter. The exhibition of this class was the largest ever made, and to Vermont breeders its success must be largely credited. A liberal sum was appropriated for the purpose, and a commission appointed to select the choicest animals available for exposition. Although their qualities have long been recognized among experts, a determined effort is now apparent, especially in Vermont, to make them a distinctively American breed.

Among the Plymouth Rocks in the poultry show was a four-legged hen which had no competitors. Perhaps of all the breeds none were more admired than the crested chickens of the Polish variety, in one class the head-gear of pure white capping a body of jet black.

The prominence of Canada in the live-stock department was nowhere more evident than in the line of blooded horses. Quebec is especially proud of the pedigree of some of her specimens descended, as they are, from a stud sent there by the king of France, in the seventeenth century, the first of pure Norman breed to be imported into America.

In charge of the horses sent from the stables of the tzar was a cavalry officer of high standing, specially appointed for the purpose. Some of them had pedigrees running back for more than a century, and it is said that there were stallions in the stud which $100,000 could not buy. The horses were known as Orloff trotters, Orloff half-breed saddle carriers for heavy cavalry service, Orloff-Arab, Russian-Arab, and light Russian draft.

Of the most noted breeds included in the Russian exhibit was that known as Arabian Orloff, and among the most beautiful specimens was Bekbovlat, ridden by Captain Theodore Ismailoff who was in charge of the stud owned by the Grand Duke Dimitry. This famous animal was bred at the Streletsky stud of the government in southern Russia, and was one of the finest horses on exhibition. In striking contrast to the Arabian beauty was the Minnesota Clydesdale, Prince Patrick, who not only captured the sweepstakes prize at the Columbian Exposition, but also took first honors at the leading fairs in Great Britain. Near the Arabian steed and the Clydesdale was placed for purposes of comparison, a typical saddle horse from Kentucky. Thus Russia, Arabia, and America met at the World's Fair.

The German government contributed 60 of the superb coach-horses for which the empire is famous. These are largely imported into France, Italy, England, and the United States, and the demand for them is steadily increasing in our own country. Of the Oldenburg breed are the massively-built animals used for heavy drafting, the Hanoverians and Holsteins being somewhat lighter in weight. The average weight of the entire consignment did not fall far short of 1,600 pounds, a noble animal of the Oldenburg type tipping the scales at 1,700. The German horses are unexcelled for breeding purposes, the laws, which are rigorously enforced, requiring that the pedigree of the studs shall be unquestioned.



AN ARABIAN ORLOFF

It was proposed by the management to hold an extensive kennel exhibit, the entries to close on the 1st of June; but, on account of disagreements among intending exhibitors, the date was postponed and the project finally abandoned.



CHAPTER THE TWENTIETH

ANTHROPOLOGY AND ETHNOLOGY



EAST pretentious among the structures of the Fair in which are housed its main exhibits is the Anthropological building, where is presented a record in miniature of man's condition, progress, and achievement from prehistoric eras to the days in which we live. In this department are several divisions and many sub-divisions, first among which are archæology and ethnology with their various branches. In the former section, beginning with the stone age, are shown portions of human skeletons and specimens of handiwork unearthed from geologic strata, from mounds and shell heaps, from caves and burial places, from the ruins of ancient cities and pueblos, and in a word from every portion of the New World where its ancient races have left their impress. From the valleys of the Ohio and Mississippi, and elsewhere to the borders of either ocean, from Mexico and Central and South America have been unearthed, after the lapse of unnumbered aions, their buried implements of stone, iron, or copper, their household utensils and ornaments, and whatever else may serve to throw light on the palæolithic and other prehistoric periods. Some of the exhibits are arranged in geographical groupings, as the models of cliff dwellings from Colorado, New Mexico, and Arizona, and of the sculptured ruins of Copan.

For those who incline to this field of investigation, a section is devoted to physical anthropology. Here, in the skulls, charts, diagrams, and models gathered from many nations, may be compared the past and present types of the human race. There are the skulls of the ancient Greek, Italian,



MAMMOTHS OF THE DEPARTMENT

German, and Helvetian; there are the skulls of savages and apes; there are casts of faces typical of tribes and nationalities; there are diagrams showing the comparative stature and anatomical measurement of men and women in various countries, with photographs, statues, and other appliances for a thorough study of this important branch of science. Elsewhere by similar agencies are illustrated the functions and activities of the brain and the organs of sense, whether in normal or in unhealthy condition. In the case of children there are also apparatus for an experimental study of mental phenomena, the subjects being chosen from those who would submit themselves to certain tests while visiting this department of the Fair.

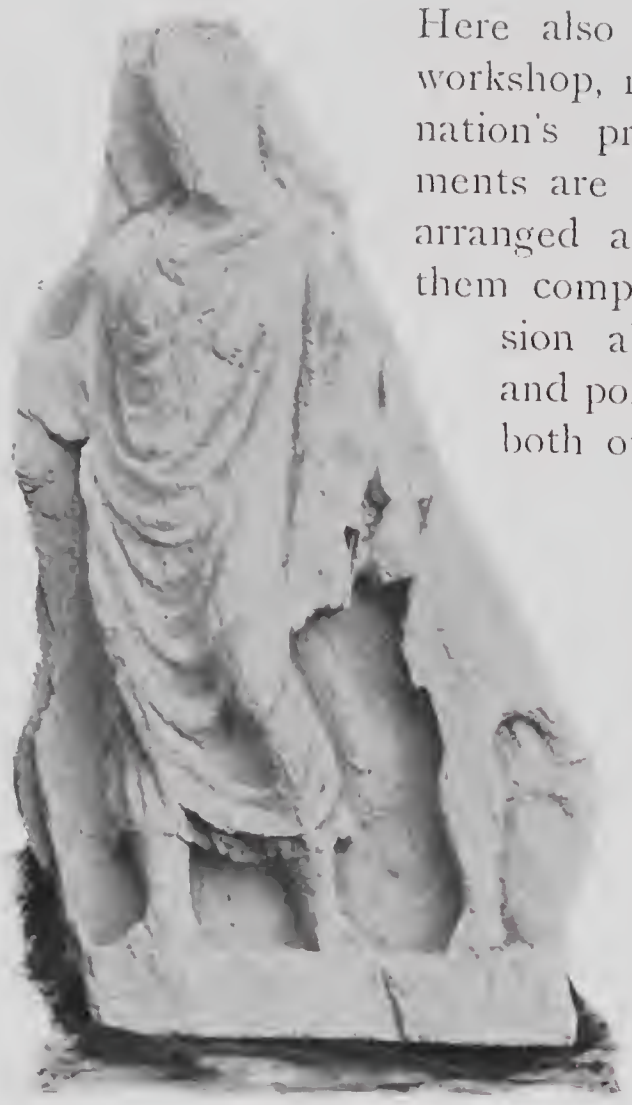
A special and most interesting section has for its subjects primitive religions, folk-lore, and games, the last being grouped together so as to form a comparative study. But it is on the exhibits relating to the



INTERIOR VIEW OF THE ANTHROPOLOGICAL BUILDING

condition and progress of man that the interest mainly centres, and especially on such as pertain to modern man; for from the relics of the buried past, whose history at best is largely diluted with speculation, we turn with a sense of relief to more practical evidences of his achievements as contained in written or printed page. Thus it has been the prime object of the ethnological display to afford an opportunity for the study of national types, not only from a scientific point of view, but as far as possible through living specimens. To this end a strong background has been obtained by placing before the spectator the representatives of races existing on this continent in the days of the Columbian era. Then are illustrated special epochs and events, with portraits and busts of those of whose lives and achievements our history largely consists, but without allusion to the annals of the civil war, a theme entirely out of place in an exposition devoted to the arts of peace.

But the exhibits of this department, and especially its historical exhibits, are not restricted to the Anthropological building. In the convent of La Rabida is a collection relating especially to the Columbian epoch, under the special charge of William E. Curtis, of the Latin-American bureau. In the Government edifice is a large gallery of paintings, photographs, and other illustrations pertaining to the Latin-American republics. In a model Indian school are the representatives of many native tribes, gathered almost from the shores of the Arctic ocean to the gulf of Mexico. Here is the civilized Indian at his task of making blankets, baskets, pottery, or at the more welcome task of eating and drinking, or playing with his children and his dogs.



A GRECIAN FRAGMENT

Here also are specimens from farm and workshop, representing the industries of the nation's protégés, while in other departments are tribal exhibits, each one carefully arranged and credited, and not a few of them competing for awards. To this division also belong the state collections and portions of the Midway plaisance, in both of which are ethnological features.

Additional attractions in this department are exhibits in natural history and taxidermy from several of the states, from the Canadian province of Ontario, and from Brazil, including valuable collections from Ward's Natural Science establishment at Rochester and from the Agassiz association at St Louis. These are not restricted to the hall of Anthropology, the Kansas state building, for instance, containing the best specimens of taxidermy displayed in the Exposition and one of the best in the world.



CORNER OF MEXICAN SECTION

The general plan, however, is to illustrate in a series of object lessons the development of various phases and adjuncts of civilization, as architecture, household conveniences, appliances and methods for the saving of life and labor, for the discipline and reform of criminals, for the cure of the sick, and the relief of those who are in need. Sanitation and hygiene, charities and corrections, properly belonging to the department of Liberal Arts, find expression in the Anthropological building. In apparatus, models, plans, photographs, and literature are shown the progress and condition of sanitary science as applied to dwellings, workshops, stores, and public buildings. Here are displayed the best systems of heating, ventilation, and drainage; the precautions used to prevent and check infectious diseases, and to minimize the danger to health incidental to certain trades. Another branch is athletic training in various forms, and still another is the adulteration of food, with the proper means for its detection. In connection with charities, asylums and homes for all classes of the unfortunate or infirm are compared in their several sections.



ESKIMO VILLAGE

Over the main northern entrance of the Anthropological building, in the southeastern extremity of the grounds, is the inscription, "Man and His Works," thus briefly and aptly explaining the purposes of the display. A floor space of more than 100,000 square feet is mainly occupied by the archæological and ethnological exhibits of foreign countries and of state boards and individuals, together with the collections gathered from various parts of North and South America by a corps of



ANTIQUE FROM CENTRAL AMERICA



AN ARRAY OF BUILDINGS WEST OF THE WOODED ISLAND



ARCHÆOLOGY AND ETHNOLOGY

the most famous of Grecian sculptures and statuary, exhumed from the mausoleums and ruins of Mycenæ and Delos, of Bœotia, Attica, and Thessaly. Among them are statues of Diana, Apollo, and Victory, with allegorical groups representing various subjects. Of special interest are the replicas of two statuettes of Minerva, executed by Phidias in ivory and gold, with figures of Mercury, one of which is a cast of what is said to be the only authenticated work from the hand of Praxiteles. Here also are represented colossal statues or fragments of Arcadian origin, once forming a portion of a group in the temple of Proserpine. Among sculptures of the fifth and fourth centuries of the pre-Christian era are



ANCIENT PERUVIAN BURIAL GROUND



ESKIMO VILLAGE

bas-reliefs from the acropolis and figures from Arcadian and Olympian temples; but most ancient of all, and perhaps the oldest specimen extant, is a relief from the Lion gate at Mycenæ. Belonging to later periods are the colossal statues of Justice and Neptune, from originals discovered in the island of Melos. Finally there are busts of the emperor Hadrian and his favorite, Antinous, with figures or heads of Hermes and Pan, of Minerva and Medusa, of Athenian youths and dancing women.

Beyond the Grecian section are other collections relating to European archæology, including those from the government museum at Vienna. A Moravian contributor shows the skull and bones of a monster bear, a cave-

assistants under the direction of F. W. Putnam, as chief of this department. In the northern portion some 30,000 square feet are set apart for the bureaus of hygiene and sanitation, of charities and correction.

Passing through the northern portal, the visitor observes a few small collections illustrating certain points in the antiquities and ancient arts of Assyria, Egypt, and Rome; then proceeding down the main aisle, he finds at its central point the government exhibits of Greece, supplemented by contributions from the Chicago museum of art. These are for the most part reproductions of

dweller of prehistoric times. In this vicinity is also a valuable display of Egyptian antiquities from Albany, with one from the imperial museum of Japan containing relics of the earlier ages of its island empire.

Mexico occupies a large area adjacent to that of Japan, reproducing not only her ancient ruins but the historic structures described by Spanish chroniclers as existing at the time of the conquest. From the Federal district comes a model of ancient Mexico, with specimens of Aztec furniture, and from various states, from the scientific institute at Toluca, from the Mexican Central railway, and many private exhibitors are other contributions which fill this large and well arranged section. Models of rural homes familiar to travellers in that country are side by side with musical instruments, household utensils, pipes, cloaks made of bark, and other apparel worn by native Indians. Aztec lances, battle axes, shields, and war drums are massed in one corner, and not far away is a group of stone heads and idols, with ancient coins, copies of antique manuscripts, water color paintings of antiquities, human skulls and jaw bones, casts of inscriptions on stone, and models,



MISCELLANEOUS SPECIMENS OF SAVAGERY

photographs, albums, and books illustrating past and present types of Mexico's native races. The Mexican Central sends an interesting collection of coins, pieces of obsidian, and plaster casts of Aztec calendars, and elsewhere are charts showing the ancient system of recording time, with painted shields of Aztec warriors and a copy of Mexico's earliest map.

On the opposite side of the main aisle Ohio, Indiana, Missouri, Wisconsin, Colorado, and the Canadian province of Ontario, most of the former through their historical societies, and the latter as a government display, have large collections of pottery, implements, and weapons pertaining to prehistoric tribes. These are supplemented by private contributions, forming together a most interesting study in archæology. Colorado, for instance, thus describes in part the history of her ancient cliff dwellers, and so with Arizona, New Mexico, and Utah. There are pottery and stone implements from the great shell heaps of Florida and Maine, while Michigan, Illinois, and Missouri contribute from their valleys and ancient village sites utensils not only of stone but of copper. Other relics are from the mounds of Tennessee, Kentucky, and Arkansas, from Connecticut, and especially from the valley of the Delaware, whence the collection was made by an agent of the Anthropological department. Several experts were also despatched to the valleys of the two Miamis, the Muskingum, Scioto, and other tributaries of the Ohio, around which cluster so many of the mysterious mounds supposed to

be remnants of fortresses and burial grounds, among which are records of animal symbols, or totems, adopted by family or tribe. The famous Serpent mound, over 1,200 feet in length, is here in miniature relief, displaying what archæologists believe to be an egg symbolic of the creation of the world. Reconstructed on a small scale are also the Turner and Hopewell groups of mounds, the latter, more than a score in number, built on a terrace, with another elevated surface bordering the creek near by, and a third not far away, where careful exploration disclosed many pieces of copper, fashioned into various geometric figures, into ornaments, and forms of bird, fish, and beast. Implements of copper, mysterious crosses of the same metal, shells, bears' claws, sharks' teeth, mica, carved bone ornaments, spear and arrow heads, and thousands of flint chippings are some of the articles taken from the Hopewell farm and exhibited in this department. Among the illustrations of prehistoric life drawn from the soil of Ohio may also be mentioned the survey maps of Fort Ancient and those of the Marietta earthworks and other well known localities.



A NATIVE HUT OF BRITISH GUIANA

After Ohio, the state of Wisconsin, through its historical society, presents the most interesting study for those who would further investigate the much disputed question of the mound builders. Here the mounds are chiefly located in the valleys of the Fox, the Wisconsin, and other prominent waterways, clustering most thickly around the larger cities of the present day. In other sections are numerous heaps of earth such as have already been described; but while these forms are also very numerous in Wisconsin, the so-called effigy mounds, in which is depicted the human figure, are believed to be peculiar to that state. Therefore it is that the tablets in this collection, showing the model and outlines of a group of effigy mounds, are considered of special value by the department.

From the neighboring state of Minnesota has been forwarded by a private contributor a section of her pipestone quarries, long considered the only source of supply for the making of the calumet, or pipe of peace, with which is connected much of the semi-religious aspect in the Indian mythology of the west. Among private exhibits relating to archæology mention should also be made of a collection from Frank G. Logan, of Chicago, purchased from H. N. Rust, of Pasadena, whose days have been passed in archæological researches extending from New Hampshire to California. There are in all some 3,000 specimens, among them the flat stones worn by prehistoric man into cup-like grooves, while crushing bones or grain, with stone hammers, axes, and rude implements for tilling the soil. From California the relics include a portable mortar, the upper part of which is of wicker work and the bottom, a stone; cooking vessels of stone and clay; stone lamps, with pieces of bark for wicks; stone rings utilized as sinkers for fish nets, as mallet heads, or as weapons; stone tubes employed by medicine men for cupping processes, and pieces of obsidian from the Klamath Indians and the ancient Aztecs, by the former used as ornaments and indications of rank, and by the priests of the latter for killing their sacrificial victims. In the Aztec groups are also polished stone work and neatly fashioned urns in which were placed the ashes of the dead.

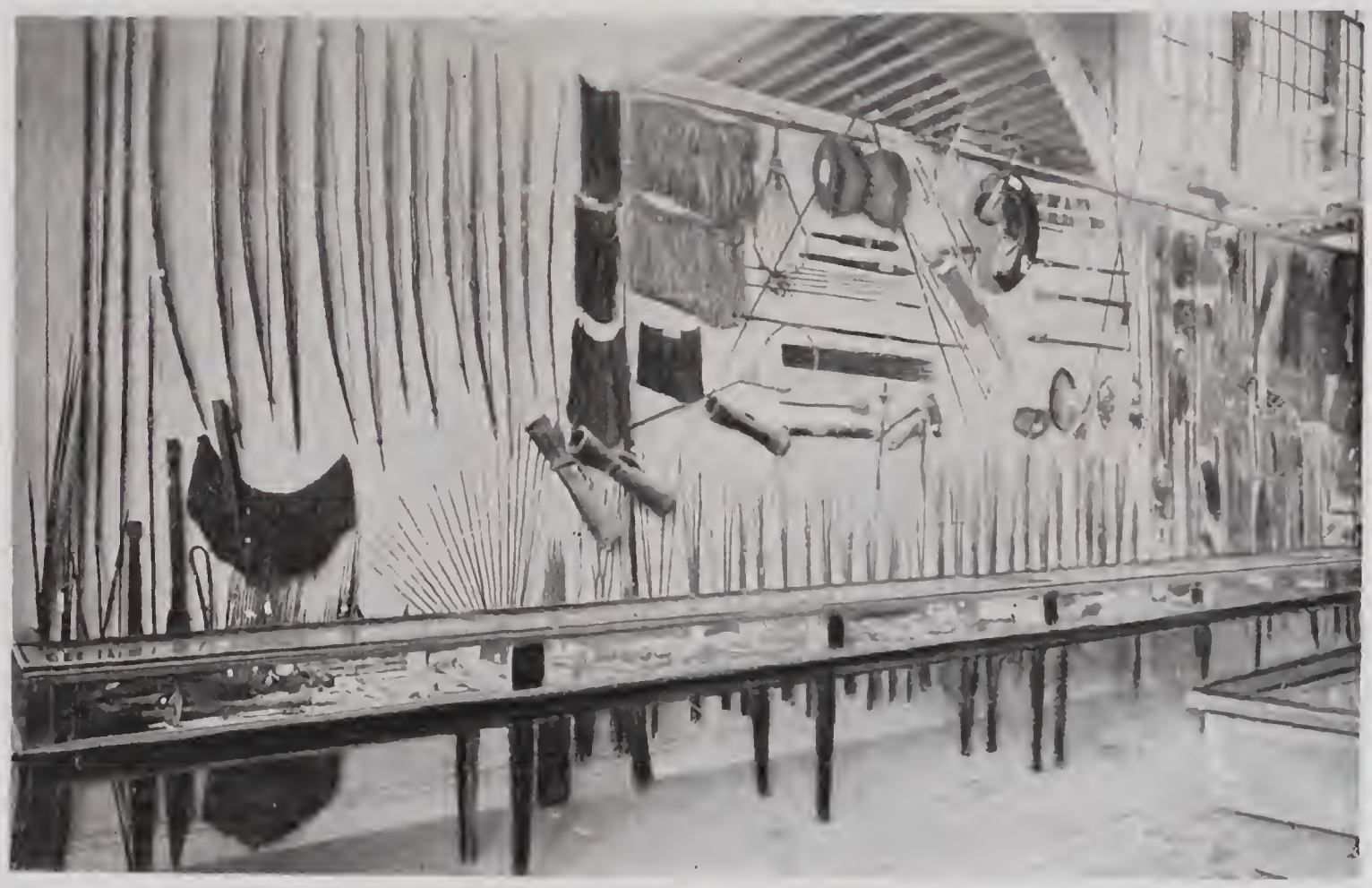


A PRIVATE ETHNOLOGICAL EXHIBIT

In other sections, separated by the width of the hall, are interesting and valuable collections gathered by the agents of the department from Honduras and Yucatan, from Colombia, Bolivia, Peru, and other points

in South America and the West Indies. As reproductions of the famous sculptures of Central America, the French minister of public instruction has furnished imposing casts, covered with strange figures and hieroglyphics, from moulds taken by Désire Charnay. Other contributions are from the Berlin museum, the government of Honduras, and the Peabody museum of American archæology. For those who care not for these strange weird forms and faces, there is a gallery of forty large photographs, representing the exhibits of Great Britain and the achievements of one of her explorers, whose views were taken from the ancient structures of Guatemala, Honduras, Chiapas, and Yucatan.

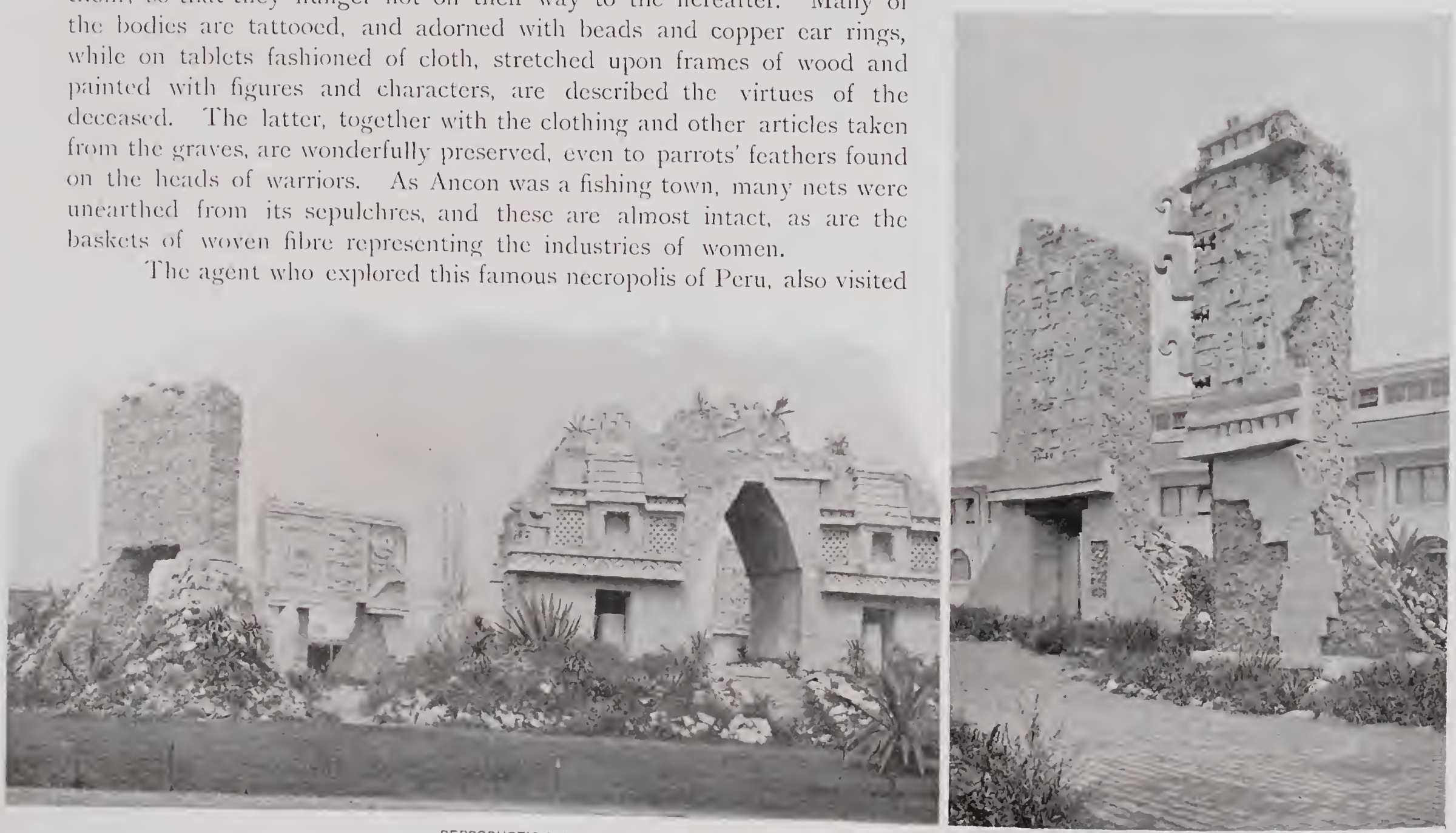
More imposing and complete than anything within the building, however, are the reproductions of the Yucatan ruins displayed, as I have said, outside its walls. The explorations were made by E. H. Thompson, the United States consul and agent of the Exposition, his moulds consisting of the portal from the central structure of the group of ruins at Labna, the façade of the Serpent house, and three sections of the house of Nuns, the last from the ruins of Uxmal.



BOWS, ARROWS, AND OTHER REPRESENTATIVE ARTICLES

Returning to the Anthropological building its most uncanny collection is from the ancient land of Peru, whence is a substantial reproduction of a burying ground at Ancon. There are ridges of gravel and sandy soil, with mummies in all positions, and skulls, bones, and cloth interspersed. The preservation of the bodies is largely due to the almost total absence of rain in the locality whence they were taken, and to the saltpetre and other preservative elements contained in the soil. There are more than 100 bodies of the Incas and other personages of note, one with colored standards and war club beside him, others swathed in richly colored blankets or cotton cloth, and all with jars of provisions beside them; so that they hunger not on their way to the hereafter. Many of the bodies are tattooed, and adorned with beads and copper ear rings, while on tablets fashioned of cloth, stretched upon frames of wood and painted with figures and characters, are described the virtues of the deceased. The latter, together with the clothing and other articles taken from the graves, are wonderfully preserved, even to parrots' feathers found on the heads of warriors. As Ancon was a fishing town, many nets were unearthed from its sepulchres, and these are almost intact, as are the baskets of woven fibre representing the industries of women.

The agent who explored this famous necropolis of Peru, also visited



REPRODUCTION OF YUCATAN RUINS, OUTSIDE ANTHROPOLOGICAL BUILDING

portions of Chili, Bolivia, and Ecuador, in the interests of American archæology. It was from the island of La Plata, off the coast of Ecuador, that he collected the rarest of the relics aside from those gathered from the burial ground of Ancon. The former was virgin soil for the archæologist, and with the coöperation of the government, he was enabled to exhume not only the bodies of the dead, but finely wrought pottery and beautifully finished cups, jewelry, and idols of gold. Slabs of the precious metal were also discovered, from which these works of art were fashioned. A large area was covered with a stratum of ashes several feet in thickness, which appeared to separate other relics from those of finer workmanship. The investigators concluded that they had found a large cemetery where the dead were burned, and that the stratum was the dividing line either between two peoples or two grades of civilization, the utensils and ornaments plainly indicating different degrees of skill and culture. In this connection may also be mentioned the large collection of pottery, wooden vessels, ornaments, implements, and various articles of gold, silver, copper, and stone, gathered in the Cuzco valley of Peru and relating to periods when this locality was the centre of governmental and priestly power. Here was the great Peruvian temple of the Sun, whose ruins are still imposing.



HYGIENIC APPARATUS

In another portion of the hall, near the casts of Central American sculpture, is a group of picturesque exhibits from Brazil, British Guiana, Costa Rica, and Paraguay. In character they partake both of the archæological and ethnological. For example, in the Brazilian section the national museum and the museum of Para contribute ancient pottery; urns containing the ashes of the dead; carved images of hideous aspect representing the heathen gods before the advent of Christianity; huge clubs, bows and arrows, blow guns, and other weapons; painted images of religious import, and household utensils made by Indian tribes of the present day. Here also is a number of pictures, a large oil portrait representing a South American native, his black body gleaming like ebony, his black hair adorned with bright-colored feathers, and his neck encircled with a necklace of teeth taken from the jaws of wild animals, while from his feathered breech-cloth hangs a quiver of arrows, the long bow which he seems able to wield to good effect lying by his side. From Costa Rica come pottery, implements, ornaments, utensils, and weapons gathered from ancient graves, large maps hung upon the walls of her section indicating the most important districts from an archælogical point of view, and large paintings illustrating the appearance and customs of the natives.

But one of the most complete collections of curios relating to the South American Indian of to-day is that which resulted from the expedition of Lieutenant Roger Welles to the upper waters of the Orinoco river. The lieutenant acted as an agent of the department, and his display consists of reed blow-guns, some of them ten feet in length; spears, large bows, and poisoned arrows with fish-bone tips; reeds bound together to form a single instrument; glazed pottery simply but tastefully ornamented; tinder boxes made of bamboo or bone; baskets, combs, boards into which flints are set for grating cassava roots, and hammocks made of the fibre of a native palm; implements used in extracting india rubber, feather head-dresses and costumes, strings of monkeys' teeth, and other articles illustrating the domestic, industrial, and warlike phases of aboriginal life. Finally there is a number of articles from the Caribs of the West Indies, the fiercest of the tribes with which Columbus had to deal.



MODEL HOUSE FOR NEW YORK WORKINGMAN

Among the ancient enemies of the Caribs, it is said that the Arawaks were the most powerful, often repelling the incursions of the former upon the mainland. One of the most notable of the ethnological specimens

is a full-blooded native of the latter tribe, brought from his forest home to assist the British commissioner in his arrangement of the Guiana section. The exhibit, one of the most picturesque in the department, is grouped in and around two huts, one such as serves for habitation the Indians of the forest, and the other those of the coast. There are hammocks of various kinds, plain and ornamented; benches of wood and tortoise-shell; tinder boxes, and the more primitive fire sticks. Elsewhere are tobacco leaves; cigarette paper made of vegetable fibre, and miscellaneous leaves and fibres, used for thatching, for twine and ropes. There are also fibres and ropes for making hammocks, and spindles and frames employed in their manufacture. In the



MASTODON RELICS



FOOT PRINTS IN GEOLOGICAL STRATUM NEVADA

line of dress and ornaments are various styles of aprons worn by the women, fashioned of bark, cotton, and beads, with cotton anklets and waist belts, plain and adorned with fringes or pendants. Teeth of jaguar and peccary are made into necklaces, and there is nose jewelry of silver and tin. Feathers of brilliant hue are used for head-dresses or girdles for the arms and shoulders; a fish spine serves as a tattooing implement, and there are dyes of red, yellow, and white for staining the face and body.

Native warrior and sportsman are represented by war-clubs, bows and arrows, blow-pipes, fish-traps and nets, and hunting bags of skin and wicker work. The arrows are of many kinds; those for killing birds, with bamboo points; for stunning them with blunt heads; for shooting fish, metal heads; for large game, metal spear heads; for turtles, separable metal heads; and poisoned arrows for game, with bamboo point and cap. Domestic life is represented in a collection of jars, jugs, gourds, and baskets; corn mortars and pestles and sugar cane crushers; graters, pressers, and baskets for the preparation of cassava; hollowed trunks for festive drinks with paddles for stirring them, and mats for protection against stinging ants and the coercion of unruly children. Wrestling shields, dancing sticks, rattles, trumpets, flutes, an Æolian harp made from the stalk of a palm, and a head-dress of leaves point to sport, music, and the dance. The environment of the native Arawak is further illustrated by cabinets of birds, fishes, and animals used for food, and a collection of photographs showing the country which he inhabits.



PENNSYLVANIA STATE COLLECTION

Thus it will be seen that the native races, both past and present, of what is known as Latin-America are fully represented in the Anthropological department. A collection yet to be mentioned is that of Emil Hassler, the Paraguayan commissioner, one pertaining to the customs not only of the native tribes of his own country, but of more than forty others, scattered over the central portions of South America. This collection, the result of many years of labor, was the only

exhibit from South American countries for which a gold medal was awarded at the Paris exposition of 1889. The tribes from which it was gathered were sparsely scattered over the territory occupied by the Tupi-Guaranis family during the Jesuit occupation, and here is nothing in the way of idols, all traces of idol worship being destroyed during the seventeenth century. The collection consists for the most part of weapons, utensils, and articles of rude manufacture. Among the first are spears whose points are made of wood, stone, bone, and iron; stone axes, and bows from which stones instead of arrows are shot. There are also primitive machines for spinning cotton threads, and a shawl of cotton, made entirely by hand; shells, teeth, hammocks, straw hats, pottery, boat and oars, fishing implements, bone knives, lip perforators, wooden ear plugs and ornaments for the head which were composed mainly of feathers.



ANIMALS AND BIRDS OF BRAZIL

In the western quarter of the Anthropological building a considerable space is devoted to the large and interesting government exhibit from New South Wales, and to the collections from New Zealand, New Caledonia, and other islands of the South Pacific. They are mainly composed of weapons, implements, ornaments, and costumes, arranged in striking designs upon the walls of the various sections, supplemented by hideous idols from the New Hebrides and Solomon groups, and by paintings of typical natives, some of them hardly less repulsive. There is, however, a reverse side of aboriginal life, furnished chiefly by the board for the protection of the aborigines of New South Wales, whose headquarters are at Sydney. From the children of the school established by this board are specimens of handwriting and needle-work, with drawings executed by a famous chief of the Ulladulla tribe, dealing principally with hunting and fishing scenes. The assortment of Polynesian curios is further enriched by contributions from the royal museum of Vienna, and by those of private individuals, among which is one from New Caledonia, while from New Zealand are implements, ornaments, and cloth of Maori manufacture.



MAMMALS OF THE PINE TREE STATE

In this vicinity also are the fetiches of central and western Africa, with the musical instruments, household utensils, ornaments, and weapons peculiar to the dark continent. On one of the walls is a group of weapons from the basin of the Congo, and the warlike Zulus furnish an interesting collection of arms, sceptres, and royal insignia, with ornaments of silver, ivory, and horn. Not far away is a group of Chinese idols and other objects referring to oriental religions, with a special display illustrative of the life and customs of the Chinese in the United States. Then come private exhibits, including baskets, bead-work, ornaments, and costumes of North American Indians. For those who wish further to investigate this subject there is a gallery of pictures, mainly by George Catlin, relating to aboriginal life in America, and showing not only types of leading tribes but chiefs prominent in the history of



SECTION OF THE ETHNOLOGICAL DEPARTMENT

Indian warfare. The Wisconsin Historical society sends an interesting exhibit of garments, utensils, and other articles bearing upon the customs of such noted tribes as the Chippewas and Winnebagoes, while a Washington contributor, who for a decade has been investigating the subject of Indian music among the tribes of the west, displays the results of her work, especially among the Nez Percés, Omahas, and Winnebagoes.

In this exposition of the life of North American Indians, however, the tribes of the far northwest furnish most of the ethnological material. Alaska and British Columbia are especially rich in this respect, and to these regions the department sent many agents, as well as to Labrador, Greenland, and other habitats of the Eskimos. Thus may be gleaned something of the peculiarities of a race which seems to be a connecting link between the old world and the new. From Alaska are pipes and other articles carved in wood and ivory, with masks and head-gear such as are used by the priests, or shamans of Siberia. There are also carved bowls; wooden chests and boxes inlaid with ivory, bone, and shell; horn ladles, dishes, and spoons; fish-knives and curious hooks; fire sticks and tinder boxes, surgical knives and a multitude of other articles among which are pictures of considerable merit. But perhaps the most interesting of all is the model of the Indian village of Skidegate, on one of the Queen Charlotte islands off the coast of British Columbia. Worthy of special note



ALONG THE BEACH FROM POINT ABOVE FRENCH GOVERNMENT BUILDING

are the carved posts, fashioned by the Haidas into shapes of beast, bird, and man, representing either some symbol which has been adopted or some myth handed down through the ages. Within the building both totem poles and structures are much reduced in size; but on the shores of the pond near by are reproductions of the originals.

Extending across the southern portion of the building is a double row of cases which mark the dividing line between the departments already described and those that relate to sanitary and reformatory measures. Grouped among the latter is material illustrative of the folk-lore, traditions, and customs of many races; but here the field is so vast that the collection has been practically restricted to the subject of games, and even in this regard it is remarkable how much mankind has in common. The basis of the collection was formed in the museum of archæology in the university of Pennsylvania, and this has been supplemented by exhibits from individuals and the leading manufacturers of appliances for games in the United States.



PENNSYLVANIA EXHIBIT

As the games are classified and arranged for comparative study, the puzzles and simple apparatus for children commence the series. Ancient puzzles from East India and China are seen in many familiar forms, those from the latter usually made of wood, bone, or ivory. Simpler still are the counting-out rhymes of children, contained in book form and common to many countries. Here the boy with his first top, which represents to him a new form of plaything, finds in one of these cases a wooden object not unlike his own treasure, discovered in Egypt and dating about 2,800 B. C. From the burial grounds of Ancon, Peru, similar objects were unearthed. The Sioux of North America made for their children, in primitive times, balls of stone and baked clay, which were spun on the ice like whip tops. Later, they fashioned them of wood, adding pegs of brass. Pop-guns and squirt-guns, it is found, have amused the children of the native tribes of East India and the aborigines of North and South America, while jackstraws, under different names, have been used in China, England, and France since time immemorial.

Games of ball were common in Egypt long before the reign of the Pharaohs, the most ancient specimens of implements being a stick and small block of wood which served for this purpose more than 4,600 years ago. They were also a favorite pastime in Turkey, in Asia, Persia, India, China, and Japan, spreading thence to Europe and the western hemisphere. All the appliances are here displayed, together with the wicker baskets and flat bat used in Spanish ball games, while a Chicago house has an exhibit of the articles employed in games of cricket, base-ball, foot-ball, golf, polo, la crosse, lawn-tennis, racket, and shuttlecock, with Japanese and Chinese forms of the last-named. Ring games of various kinds are illustrated, and a collection of large Burmese seeds and the knuckle bones of Turkish sheep, weighted with lead, are among primitive forms of marble playing, other implements being shown as in use to-day. To illustrate the comparatively modern games of bowls, billiards, and croquet, a Chicago company shows apparatus and miniature models of



MODEL OF OHIO SERPENT MOUND



VIEW FROM TRANSPORTATION BUILDING, LOOKING NORTH

remarkable beauty and finish, while another interesting collection is from the Chicago curling club. Adjoining is a case in which are gathered from China, Korea, Japan, Siam, Egypt, Morocco, Peru, and New Mexico, the boards and pieces for games resembling chess and draughts. The boards used in the Japanese and Peruvian games of fox and geese are almost identical, and as these were unknown in either country until the sixteenth



HAUNTS OF THE CLIFF DWELLERS AS SEEN AT THE FAIR

century, it is inferred that they were of Spanish origin. Perhaps the most interesting form among this class of games is furnished by the Zuñi Indians of New Mexico, the board upon which it is played being divided into 144 squares, each of which is crossed by two intersecting diagonal lines. Says Stewart Culin, in charge of the folk-lore department: "The moves are made one square at a time along these diagonal lines, the pieces being placed at the angles of the squares. Two or four persons play. They each start with six men, and their object is to get their men across to the other side and occupy their opponent's places, capturing as many of his pieces as possible by the way. A piece is taken by getting it between two others, as in the modern Egyptian game of seega, and the first piece thus taken may be replaced by an extra one belonging to the player who makes the capture, which may move on the straight as well as the diagonal lines and is called



FRAGMENT SHOWING THE FEAST OF BUDDHA



BUDDHA'S WEBBED HAND

the priest of the bow. This game, which is arranged and is exhibited by Frank Hamilton Cushing, is called *A-roi-thlak-na-kwe*, which he translates as 'stone warriors.' Edward Falkener in his work entitled, *Games Ancient and Oriental*, which he lent for exhibition here, has published a restoration of the ancient Egyptian game of

senat from fragments of Egyptian boards which have come down from 1600 B.C. The game as thus restored is in some respects similar to the Zuñi game, the men being taken as in seega by getting them between two others. The Zuñi game, however, may be regarded as in advance of any other board game even of our own civilization, until we come to the true game of chess.



INDIANS OF BRITISH COLUMBIA

"Chess stands alone among games. We do not find the links that connect it with lower forms of board games, and the Indian game from which our own is derived, almost without change, is the source from which the many variants of the chess game doubtless originated. Several of these offspring of the Indian chess are shown in this case, including those of Burma, Siam, the Malay peninsula, China, and Japan. A Moorish board is exhibited with them, and European chessmen and boards follow. A finely carved ivory chess set represents the pieces that are made for export by the Chinese at Canton. Draughts, which in the opinion of Edward B. Tylor may be regarded as a modern and simplified form of chess, now follow, and here are shown two sets of interesting German draughts-men of the eighteenth century."

Games of chance, in which dice, dominoes, and cards, or their equivalents, are variously employed, are *included in a division which is profusely illustrated.* The American Indians almost throughout the entire continent played a game with marked plum-stones, bones, or wooden pieces, a small basket taking the place of the dice-box. In the East Indies cowries are used; in Peru, knuckle bones, and in China the roots of the bamboo. Specimens of these and other primitive implements are displayed, among them the bones in their natural state from the legs of the sheep, used by the Syrians in their games of chance. The oldest die in the collection is made of pottery and bears date 600 B.C. It was discovered among the effects of the Greek colony of Naucratis in Egypt.



LONG CABIN OF THE SIX NATIONS

The game of dice, it is said, was carried from India into China, where the twenty-one possible throws with two pieces each received a name. To this day it still remains the principal game of its class in the flowery kingdom, where in the twelfth century dominoes were invented and cards evolved from dominoes and chess. All this is clearly illustrated, as also is the origin of backgammon from the game of "Twelve Lines" played in the time of the Roman empire and during the middle ages. From Damascus is a pearl-inlaid backgammon board, and a similar article is displayed by the Siamese commission. In China and Japan, however,

backgammon is not usually played as in Europe and America. In one of the Chinese games here exhibited is a large paper chart upon which are printed the titles of various officials, and the players are advanced or degraded in rank according to the throws of their four cubical dice.

Besides the Chinese, there are several packs of East Indian cards, circular in form, with flower and proverb cards from Japan, and some of the earliest specimens known to Europe, including those which first



QUARTERS OF THE NAVAJOS

appeared in Venice. It is generally conceded that playing cards were invented in China during the twelfth century; and among the most interesting of the collections is the one exhibited by W. H. Wilkinson, consul at Swatow, consisting of a series of dice, dominoes, and cards gathered from the principal cities of the empire. From this it may be seen how very similar are the games of cards as played in China and Europe. The suit marks in the Italian cards consist of money, cups, swords, and clubs, and during the early period of their manufacture the printing was performed with stencils. Side by side are the cards that were used in Florence,



BIRCH BARK HUTS OF PENOBSCOT INDIANS

Milan, and Naples, with the stencils, brush, and unfinished card sheets from a Florentine maker who still adopts this ancient mode of manufacture. In the old German packs the suits are hearts, bells, leaves, and acorns, and in the court cards the queen is omitted. Beautiful specimens of modern make are also exhibited,

which show the French suit marks of hearts, diamonds, spades, and clubs, now generally adopted. Other European varieties are here, as well as various Spanish and Mexican packs, some of the latter resembling those of Italian make.



CLASS OF INDIANS IN FRONT OF SCHOOL

As already stated, the bureaus of charities and corrections and of hygiene and sanitation, included in the department of Liberal Arts, were installed in the Anthropological building, this being due to the urgent demand for space by the educational institutions of the United States and foreign countries. The aim of the latter bureau was to demonstrate, as far as possible, the condition of sanitary science at the present day, and especially to show that it has not received the attention and support which its importance demands. Notices were sent to universities and colleges, boards of health, sanitary and hygienic societies, physicians, manufacturers of gymnastic and hygienic supplies, and the public generally, soliciting contributions to the several groups into which the exhibits were to be divided. The result was a most creditable display, not least among the purposes of which was to call the attention of municipal authorities to the lax sanitary systems prevailing in their midst. If in this it did not altogether succeed, that was through no fault of the department. In the section containing gymnastic and hygienic supplies a Providence company has in its spacious pavilion every form of appliance; a St Louis house exhibits apparatus for home training, and a Michigan sanitarium displays models of its buildings and the articles therein contained, especially as to the styles of dress considered most healthful for women and best adapted to their physical development.



WILLIAM E. CURTIS

In the section devoted to physical development, training, and condition are numerous appliances, for the most part of modern fashion. Beginning with the nursery and its accessories, they include such as pertain to gymnasia, to wrestling, rowing, hunting, skating, climbing, and acrobatic and other exercises, with special apparatus for the drill and training of pupils in public schools and higher institutions of learning.

In the hygienic and in other departments there are various appliances for analyzing food and water and for sterilizing meat extracts and infant foods, thus removing all disease germs. Many of these are from German inventors and sanitarians, while state boards of health show their interest in this line of investigation by contributions of hygienic literature, with maps and diagrams, and of appliances used in the detection of impurities and adulterations. For example, Pennsylvania displays a bacteriological outfit, including apparatus for collecting specimens of drinking water from hydrants. From New Jersey are specimens of adulterated foods and drugs, while Massachusetts illustrates modern methods of analyzing them. Women have also many practical suggestions to offer in this connection,



THE ORIGINAL LA RABIDA IN SPAIN

the Ladies' Health Protective association of New York, for instance, furnishing models and photographs of abattoirs and dust carts. The empire state is further represented outside the building in a frame structure and tent, the former containing the exhibits of cooking schools, with a model kitchen and a lecture room where also are held discussions and practical demonstrations having a special bearing on the preparation of foods for invalids and children. Within the tent is a complete outfit of camp utensils, with health appliances for out-door life. The exhibit of the cooking schools is under the management of Mrs. J. S. T. Stranahan, Juliet Corson, the founder of the first institutions of this character in the United States, acting as the leader of the classes.



INTERIOR VIEW OF LA RABIDA

Before taking leave of this subject, it may also be stated that in the Anthropological building is a large collection of apparatus for cleansing water—not only so-called germ-proof filters, but appliances for purifying both water and meat by electricity. For those who desire still further to pursue their investigations, there is an abundance of literature devoted to the subject, with dietaries especially designed for the army, the navy, and the prison, while in models, charts, and transparencies are shown the effects of disease caused by impure food and water, with the appearance of the special germs which the vitiated blood is unable to absorb or reject.

A division of the hygienic department in which many are interested is that which illustrates improper modes of building, draining, ventilating and warming, the defects being shown in tenement houses, flats, city and country residences, as well as in public structures. New York and Pennsylvania are especially prominent in showing the latest improvements in the construction of tenement houses and residences for working-men. At the north end of Midway plaisance the women of Philadelphia have reproduced one of the 170,000 cottages owned by the working-men of that city, and here is in truth a model as to sanitary requirements. In the southern portion of the grounds New York is represented by a plain frame structure of two stories, surrounded by a small grass plat and flower garden, such as can be built for the sum of $900, and large enough for a married couple and a family of several children.



ONE OF THE ENTRANCES

As to questions relating to public health there is also a large amount of material from many states, including, diagrams, maps, and publications explaining their sanitary condition, with the means adopted to prevent disease. Water-works and sewerage systems, public baths and lavatories and the various methods for disposing of sewage and garbage are illustrated in this division. Several manufactories also exhibit special appliances, a Des Moines company showing a fire closet made of iron stone, intended for burning the refuse from private or public buildings. In the extreme southeastern corner of the grounds the same company has a furnace constructed for city use in which is



THE CHAPEL OF THE CONVENT

consumed a portion of the garbage collected from the Exposition grounds and restaurants.

In illustrating the various methods for the prevention and arrest of epidemic diseases, the plan embraces compulsory vaccination and the results attending the isolation of infectious diseases, as well as measures for the exclusion and elimination of animal epidemics. In this group is fully illustrated the quarantine system of the country, and especially in the appliances used at the Mississippi river station below New Orleans. A model of its plant, which is one of the best of its class, is placed upon an elevated platform, and includes a wharf supported on piles, with a vessel moored to it undergoing fumigation. Alongside the vessel is the quarantine tug-boat, on board of which are the sulphur furnace and suction blower used in purifying the air in the hold. Pipes lead from the tug to the open hatches of the ship, whence the foul air passes through the furnace, while sulphurous acid is forced into every crevice below the decks. Along the front edge of the wharf are the pipe and a connecting system of hose, through which bi-chloride of mercury is distributed wherever a disinfecting solution is required. Along the front of the wharf is a railroad track, with a car containing a second fumigating apparatus, which can be placed opposite any hatchway where it is needed. But the most interesting feature is the method of disinfecting the ship's bedding and furnishings, and the wearing apparel of the passengers. The apparatus consists of a series of connected steel cylinders, extending along the wharf, their open ends facing the vessel, and each cylinder fitted with coils of steam pipe. In rear is a large boiler which supplies the steam required to destroy the germs of disease, thermometers placed at convenient points showing when the proper degree of temperature has been reached.

In less attractive fashion is exhibited the quarantine system of New York and the city water supply from the Croton aqueducts, while Buffalo sends photographs of its public crematory, and the Massachusetts board of health an exhibit which is worthy of special mention. In the principal court of the pavilion occupied by this board are diagrams and charts illustrating its scope and work in relation to diseases and epidemics, with vital statistics, statements of comparative mortality, and the influence of density of population upon the public health. As this organization is intrusted by legislative enactment with the guardianship of the inland waters of the state, it has established an experiment station near the Merrimac river at Lawrence. Here samples of the water supplied to cities and towns are analyzed, special reports being made of the results and of examinations into methods of sewage disposal. There are also photographs, charts, filtering sands, a specimen experimental filter, and



CORNER OF THE COURT

other appropriate material. Elsewhere in this section, and in a smaller pavilion or annex, are exposed the various systems of adulteration in food and drugs, with specimens of trichinæ, charts bearing upon trichinosis as existing in Massachusetts, plans of the sewage system of Boston, and photographs of the precipitation works of Worcester by chemical agencies, with views of the sewage fields in operation and diagrams of the principal filter beds constructed throughout the state.

But it is on the department of charities and correction that many of the states, and especially Massachusetts, New York, Pennsylvania, Ohio, and Illinois have concentrated their exhibits, forming together a most elaborate and interesting display. The mentally defective, the deaf and dumb, the sick and injured, the orphan, the criminal, and the pauper, all these and other classes are represented in the many institutions described on printed page, or shown in photograph and model. Of special interest are the miniature reproductions of the New York and Pennsylvania institutions, the model of the Elmira reformatory being the largest in the hall and



LOOKING TOWARD ELECTRICITY BUILDING AT NIGHT

so constructed that the visitor can not only examine the front of the structure but the arrangement of the cells and the interior plan. A ghastly object is the fac-simile of the heavy oaken chair, with its cushioned foot-rest, in which Kemmler, the murderer, was put to death by electricity.

From the empire state are pictures and charts of the Buffalo hospital for the insane, a model of the Utica asylum, and exhibits representing the Willard asylum, the Binghamton state hospital for the insane, and the industrial school at Rochester. There are also contributions from the New York house of refuge on Randall's island, from the Hebrew orphan benevolent association, the Hebrew technical institute, the St John's guild floating hospital of New York, the soldiers' and sailors' home of Bath, and the Fitch crèche of Buffalo, the last with a practical exhibit of its methods and workings in the Children's building. Among others are the Letchworth plan for an almshouse, and such establishments as the Fitch accident hospital in Buffalo, the cancer hospital for women, and the Montefiore home for chronic invalids. Accompanying these exhibits is a mass of general information presented by the state boards in charge of reformatory and charitable institutions.

The excellent penal systems of Pennsylvania are displayed to good advantage in the large and faithful models of the penitentiaries at Philadelphia, Allegheny city, and Huntingdon. The well known reform school at Morganza is represented by specimens of work contributed by the inmates, as also is the industrial home for

blind women at Philadelphia. A number of orphan asylums and aid societies testify to Pennsylvania's activities in this direction, while her reputation for medical science is upheld by such organizations as the Jefferson medical college and the Jewish hospital association of Philadelphia.

In the Massachusetts section there is a model of the hospital department of the state almshouse at Tewksbury, the management of which was investigated several years ago, with results that caused a profound sensation throughout the United States. Another model is that of the McLean hospital at Somerville, including

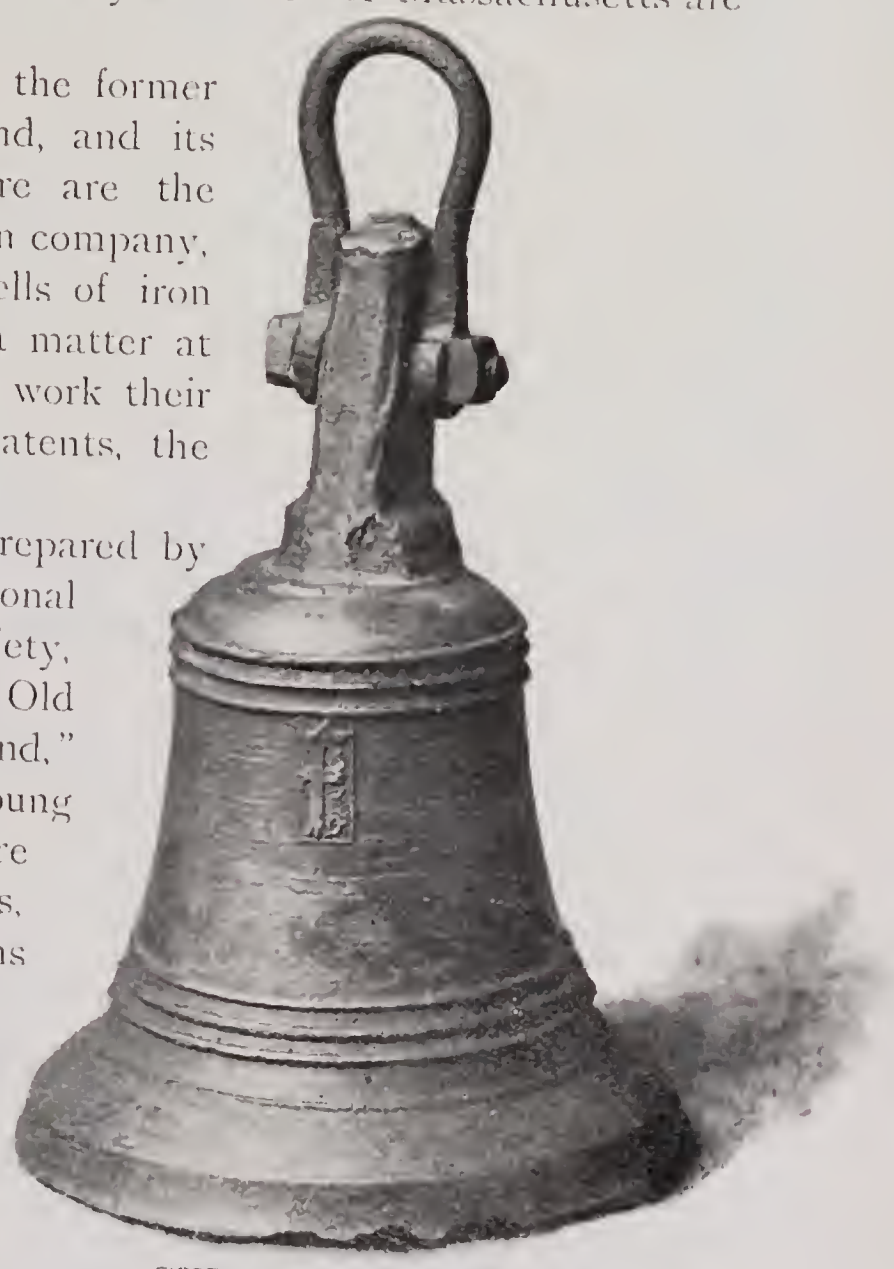


QUEEN ISABELLA OFFERING HER JEWELS

the training school for nurses, with photographs and explanatory material. The appliances used in the Boston city hospital and nurses' school form an instructive feature of their exhibit, and there are specimens of work from several industrial schools, from the reformatory for women at Farmingham, and the penitentiary at Concord junction. With these and a few other exceptions the charitable and reformatory institutes of Massachusetts are represented mainly in pictorial and literary form.

Among the western states Ohio and Illinois are largely represented, the former by its insane asylums, its girls' industrial home, its home for the blind, and its state reformatory. As to the construction of penal establishments there are the exhibits of the Van Dorn iron works, of Cleveland, and the Champion iron company, of Kenton. Here are shown the strongest locks, doors, window guards, cells of iron and steel, and all else that is needed to keep the criminal safely in jail, a matter at least as important as to keep him out of it. The firms which make such work their specialty employ their own architects and control a large number of patents, the secrets of which are closely guarded.

In the Illinois section are charts relating to crime and pauperism, prepared by an expert, and identical with those which were published in the eleventh national census. The charities of Chicago are represented by its Relief and Aid society, its Children's Aid society, by two German organizations, one of them an Old People's home, and by an exhibit in connection with the "fresh air fund," established by the *Daily News* for the care and medical treatment of young children at its sanitarium in Lincoln park. From the school of agriculture and manual training at Glenwood is also a display of photographs, statistics, and specimens of work. Baltimore sends a model of the Johns-Hopkins hospital and illustrates the workings of its training school for nurses, while from other cities and states, and even from individuals are exhibits which attest their interest in this department of the Fair.



FIRST CHURCH BELL IN AMERICA

In the gallery of the Anthropological building are the sections devoted to natural history, history, and anthropology, the exhibits in the last

of these divisions being installed in a series of laboratories. Here are also the offices of the department and a number of miscellaneous groups. Occupying the entire southern aisle is the collection from Ward's Natural Science establishment, of Rochester, New York, in the centre of which is the Siberian mastodon, reproduced from the royal museum at Stuttgart, 16 feet high and with curved tusks six feet in length. Among the remains of mastodons taken from the ice near the mouth of the river Lena, during the eighteenth century, were portions of skin covered with long, coarse hair. Thus, with the skeleton reconstructed, scientists were enabled to clothe it as here represented in its natural state. Near by is the huge frame of a plesiosaurus, 22 feet long, the original of which was unearthed from English soil. The ichthyosaurus, the megatherium, the gigantic elk of Ireland, the wingless moa from New Zealand, the armadillo from Montevideo, and other evolutionary forms of bird, beast, and fish are also displayed in skeleton form or as casts, many of the latter taken from the British museum. Suspended from the gallery ceiling is the skeleton of a whale, and elsewhere a huge octopus with arms outstretched as if to seize its prey. Other specimens there are, from those of mammals, especially deer, elk, and moose, largely from Maine and Colorado, down to trilobites, corals, and crustacea, together illustrating the progressive forms of animal life through many geologic eras.

Of fossils the most valuable collections are from Nevada, Wisconsin, and Indiana, and especially from the first of these states, which shows specimens unearthed in the deepest levels of its mines, some of them



COLUMBUS' RECEPTION AFTER HIS FIRST VOYAGE

from strata 2,000 or 3,000 feet below the surface. Of special interest are the footprints found at Carson in a Laurentian formation of the azoic division of rocks, a granitoid gneiss, in which no traces of life had before been discovered.

In the eastern aisle is fully illustrated by state, individual, and foreign exhibits the fauna of the present and recent periods, grouped in a series of exhaustive and interesting collections. From the New York state museum is a display of mammals, large and small, including life-like specimens of elk and buffalo, and an assortment of land and fresh-water shells. An Albion naturalist has cases of birds' eggs and a number of delicate wall pieces showing the manner of nesting, one of them representing a family of ruffed grouse, the mother carefully guarding the eggs, with a brood of little ones half hidden in the grass.

A group of moose heads is a prominent feature in the Ontario section, and close at hand is a family of otter, one of them in the act of devouring a fish, the latter the work of a New York taxidermist. On a mass of rugged rocks are displayed the birds and mammals of Pennsylvania, the birds among bushes or perched upon branches of trees, a black bear protruding his snout from a cave, and squirrels, otter, mink, muskrats, and other animals, all in their natural habitats. The Agassiz association, of St Louis, Missouri, illustrates its work in promoting the study of natural history, and among private contributions is a collection of moths and butterflies gathered from every quarter of the world. Here also the government of Brazil has a small exhibit,



SOUTH FRONT OF MANUFACTURES BUILDING, WITH SECTION OF PERISTYLE

in which are the crouching cougar, leopard, baboon, boa-constrictor, and various birds of bright plumage and discordant voice.

As to the contents of the northern gallery, they are thus described by the chief of the Anthropological department. "Here," he says, "is a large collection of instruments and apparatus, received from the more important anthropological laboratories of the universities in this country and from several in Europe, with a very interesting series of apparatus made especially for this exhibit by the principal makers in Europe and the United States. The laboratories are divided into three sections—physical anthropology, neurology, and psychology. In these laboratories the practical working of the apparatus is shown, and any one who wishes can have various tests applied, and can be measured and recorded upon cards, which are given to the subject upon the payment of a small fee, while the record is made upon the charts and tables hanging on the walls of the laboratory to illustrate the various subjects. Here, too, is a series of skulls and skeletons and various models showing the physical characteristics of the various races and varieties of man. An interesting series of charts in the physical-anthropological section is that illustrating the development of over 90,000 school children in various



VISTA FROM WOODED ISLAND

cities of North America. Another series of diagrams and maps shows the physical characteristics of the Indians of North America, as derived from measurements and observations upon 17,000 Indians, recorded by about seventy-five assistants of the department, who were engaged for nearly two years in this work. One of the alcoves is devoted to the Sargent models of the typical man and woman and the anthropometrical work illustrating physical development. Another alcove is devoted to the anthropological library formed by the department, and on the walls are the plans and photographs of several of the principal anthropological museums."

Elsewhere is a variety of groups, consisting largely of collections of coins and postage stamps. From a Russian contributor comes a private collection of the rare ancient coins from his native land, with others belonging to the classic era of Greece and Rome. Clocks of an early date, ancient and modern weapons, and antique metal work and ornaments fashioned by the Norse colonists of Iceland are also among the individual displays. Coming nearer home, Pennsylvania and Ohio have exhibits relating to the history of the republic. From the former is a model of the Yorktown court-house of revolutionary days, and the latter reproduces the Campus Martius of Marinette, the pioneer settlement of the west.

Bearing more directly on the Columbian Exposition than any of the collections within the hall of Anthropology are those which are stored in a monastic edifice elsewhere in the grounds. As the visitor passes from

the central court toward the pier which extends into the lake, he observes at the extremity of a rocky headland on his right a gloomy, odd-looking structure, with belfry and tower, with small, dark windows let into plastered walls, and heavy, cumbersome doors, its sombre aspect somewhat relieved by a roofing of red tiles. The building and its immediate foreground are reproduced from the monastery of La Rabida, within a league of Palos, where Columbus, asking for a morsel of bread and a cup of water for his boy, Diego, was invited to make his abode, and matured the plans which gave to Spain her New World empire.



CONVENT NEAR SEVILLE

Rich in historic interest is this little hamlet of Palos, once a flourishing port, but now a dilapidated village, with a few short grass-covered streets, deserted by all except for a few fishermen and farmers, its waters so low that only the smallest craft can reach the rush-grown harbor whence the Columbian flotilla set sail toward the unknown. Here are still pointed out the ruins of the house where the Pinzons dwelt, and on a hill in the outskirts of the village is the Moorish mosque, converted into a church, where in May, 1492, the alcalde Rodriguez Prieto read from his pulpit the mandate of the Spanish sovereigns, ordering the people to furnish and equip two vessels for the use of the expedition. Of this mandate or proclamation the original is shown in the chapel of La Rabida at Jackson park.

Apart from the interest which attaches to La Rabida because of the Columbian episode, there are other historic associations dating back to the second century of the Christian era. While the emperor Trajan was sojourning at Seville occurred the death of his daughter, Proserpine, whereupon the governor of the province, to secure his favor, erected a temple where now the convent stands, and placing on its altar a golden image of Proserpine, offered pardon to all offenders who should seek the protection of its shrine, bidding his people here to hold festival on each recurring birthday of the Cæsar's child. During the decadence of the Roman empire the temple passed under the control of the Christians, who, assimilating this festival with their own ceremonies, gave to it the name of the Candelaria or Purification. An image of the virgin, a gift from the bishop of Jerusalem, carved, as the legend relates, by Saint Luke, and possessed of miraculous powers, was replaced by the Moors with a bone of Mohammed, which remained on the altar until their expulsion from the western seaboard. In the twelfth and thirteenth centuries the monastery was occupied by the knights-templar, who decorated its walls with classic paintings of considerable merit. After the monks returned to its cloisters, the prior ordered that a coat of white plaster be laid upon them, lest the meditations of the brethren be diverted by these nude figures of Venus and Juno, of Cupid and Bacchus. When Columbus arrived at La Rabida it had but recently come into the possession of the Franciscans, to whom, on the 12th of October, 1492, Isabella of Spain gave a deed conveying all rights and titles.



CASKET AND CHEST, CONTAINING COLUMBUS' DUST AND BONES

Such, in brief, is the history of this famous convent, the full title of which, rendered in English, is The Monastery of St Mary on the frontier. In the reproduction is the exact appearance which it presented in the days when Columbus accepted the hospitality of the fathers; for to this condition the original was restored by the Spanish government. The task was intrusted to Señor Velasquez, a trained and skilful architect, a man of artistic tastes and archæological lore, one thoroughly conversant with the religious and historic associations connected with his subject. By a lieutenant in the United States navy, engaged in constructing the Columbian caravels, the plans and drawings of Velasquez were secured for Exposition purposes, and the result was the building already described.



HOUSE IN WHICH COLUMBUS DIED

The project for the historic collection of La Rabida was submitted to congress and the board of directors by William E. Curtis, chief of the Latin-American bureau and director of the bureau of the American republics. It was favorably received; was endorsed by James G. Blaine, the secretary of state, and largely through his efforts a portion of the funds set apart for the government exhibit was devoted to this purpose. Then the chief set himself to work, intending, as he says, to gather every existing relic of Columbus; the originals or copies of every picture, statue, and monument relating to Columbus and the history of his career, with all the rare manuscripts, books, and charts pertaining to the discovery and early settlement of America. A well-known author and naturalist was sent to the West Indies, with instructions to follow in the track of the discoverer, and with photographic apparatus for taking views wherever he might find a subject; another performed the same duty in Spain; by the United States consul at Genoa representations were secured of the birth place and early career of Columbus, and by a man-of-war were visited the site of Isabella and the spot where the *Santa Maria* was wrecked. From ministers and consuls many treasures were secured, with loans from foreign collections both public and private, and assistance from those who had made a special study of early American history.

The exhibits in the first section are intended to explain the condition of geographic science at the time of the discovery. Among them is a fac-simile of Martin Behaim's globe of 1492, on which is represented about all that was known of the earth's surface at the time of the first Columbian expedition. There is also a group of maps and charts showing the growth of geographic knowledge from the days of Ptolemy, the father of geography, with copies of his works and those of other writers of his age. There is a reproduction in bronze of a celestial globe of the eleventh century, and of Arabian make. There is a crusaders' map of the thirteenth century on which is indicated the route from London to Jerusalem, with other maps and charts from the thirteenth to the sixteenth centuries. There is a portrait of Marco Polo, with a copy of his book of travels with some marginal notes made by Columbus during his several voyages. There are evidences of pre-Columbian discoveries, especially those of the Norsemen, with a picture of a ship such as that in which, in the tenth century, Leif Erikson voyaged from Greenland to Vinland. Of exceeding interest are the copies of documents furnished by Leo XIII from the secret archives of the vatican, where 14,000 volumes were examined as to the claims of Norsemen to the discovery of America. While these claims were not substantiated, it was proved that a catholic bishopric existed in Greenland as early as the twelfth century, and that to the east of it were regions peopled by savages.



THE POPE AT THE TIME OF THE DISCOVERY

Another section, relating to the court of

Ferdinand and Isabella, contains portraits of the latter as a child, as a queen, in the armor which she wore at the siege of Granada, and in the act of accepting its capitulation. There are also fac-similes of her golden sword, her sceptre, crown, and treasure-chest, with the original of her will executed at Medina del Campo on the 23d of November, 1504, the day before her death. Other portraits and statues are of Ferdinand as a boy and in middle age, of their son, Don Juan of Aragon, of their daughters Isabella and Juana, of Charles V, Phillip II, and Alfonso XII. In models or in graphic art are represented the castle of Medina del Campo, the city of Santa Fé, the tomb of Ferdinand and Isabella, the Alhambra, the surrender of Boabdil, and the Torre del Picos through which the Moorish sovereign rode when about to deliver the keys of his castle and palace.

A third section is devoted to the birthplace, parentage, and boyhood of Columbus, with pictures of every place and scene with which he was identified before his arrival in Spain. There are views of the city and harbor of Genoa, of the house and street in which he is said to have been born, and the home at Quinto



LOOKING FROM THE ADMINISTRATION BUILDING

where his father and mother lived and were married. The village of Cogoleto is also shown, and the street that fronts on its beach, where is an ancient structure with the following pretentious inscription: "Traveller stop at this place. It was here that Columbus, the greatest man in the world, first saw the light; here in this humble house! There was one world: this man spoke, and there were two." There are views of the university of Pavia where he studied; of the church at Lisbon where he married; of the Madeira islands and the houses in which he lived at Funchal and Porto Santo, with a table and a cane made from the timber contained therein, and the door, doorstep, lock, and key taken from one of these dwellings.

Then follows the history of Columbus in Spain, with pictures of the original monastery of La Rabida, and some of the bricks and tiles that were used in its construction more than sixteen centuries ago. In a series of photographs or copies from celebrated paintings, are shown the places where he lived or visited, with all the varied incidents of his career. There is Columbus asking alms at the monastery gate, in consultation with Father Marchena, before the Dominicans, the junta, and the council of Salamanca, at the court of Isabella, recalled at the bridge of Pines, and receiving from the queen the offer of her jewels. Other views are also identified with the story of his life, as of the cell in which he lived at La Rabida; the city of Cordova, its mosque, and its old Roman gate near which he sojourned for several months; the town of Palos, its church of



INTERIOR VIEWS OF LA RABIDA

St George, and the tavern where he rested midway on his journey from the convent.

In the following sections are illustrated his several voyages and the incidents and associations connected therewith, from his leave-taking with Father Marchena in 1492 to his shipwreck at Christopher's cave in Jamaica in 1504. Relating to the first of these voyages are valuable charts presented by the historian, Rudolph Cronau, with pictures loaned by Spain, Germany, and France, and one by the Italian artist, Gabrini representing his landing at San Salvador. The caravels are reproduced and the departure from Palos, the mutiny at sea and the first cry of land. In photographic form are shown the points at which he touched in Cuba and San Domingo, with the site of the Indian village of Guarico, where the wreck of the *Santa Maria* was brought ashore, from which the admiral built his fort of Navidad. There is also the anchor which he carried on his flagship, found in the ruins of the stockade after its destruction in 1493, with other relics gathered in its neighborhood. Of Watling island there are several sketches, including the spot where Columbus is said to have landed; its coast, its lagoons, and interior; its lighthouse, Baptist chapel, and magistrates residence; its farmers and fishermen, the former still earning a scanty livelihood by raising meagre crops of grain and vegetables. From an old print is shown the island of San Salvador as described in the journal of the discoverer. There are also views of St Mary of the Azores; of Lisbon from the point where Columbus landed in 1493; of Barcelona and his reception there by Ferdinand and Isabella; of the wonders which he described, and of Hogarth's rendition of the oft repeated story of the egg.

Pertaining to the second voyage are many views of Isabella, or rather of its ruins, whence and from its neighborhood were transferred to the convent at Jackson park all the relics worth preserving, even to the stones of which its ancient church was built and the Moorish tiles and pieces of metal which the Spaniards brought with them to their first settlement in the New World. There are also fragments of armor, lance-heads, horse-shoes, stirrups, and spurs, with an iron cross of antique design and a hawk's bell used for trading with Indians in exchange for gold. But most interesting of all is the church bell which Ferdinand presented to the infant colony, the first one that proclaimed the glad tidings of salvation offered at the point of the sword. Quite a history of its own has this so-called "bell of the fig tree," on the surface of which are the initial letter of its donor's name and an image of St Michael, the patron saint of its sanctuary. Removed to La Vega in 1494, with everything else that was removable, when gold enticed the Spaniards into the mountains of Cibao, it was hung in the tower of the chapel, and there remained, until, seventy years later, the town was destroyed by an earthquake. For three centuries or more it lay amid the ruins, from which it was unearthed by a shepherd beneath the vine-covered masses of débris that buried the church and its bell. Thence it was taken to a church at Santo Domingo, where ever since it has been regarded as one of its most precious relics.



MOSAIC PICTURE OWNED BY VATICAN

The third voyage is illustrated in many paintings and photographs, as of the Boca del Drago near which Columbus first set foot on the mainland, and thence turned northward, his system racked with the gout and his eyes almost sightless from exposure and want of sleep. The anchor is shown which he cast off the island of Trinidad on an August night of 1498, when a wall of water from the estuary of the Orinoco threatened destruction to his ships. While digging a trench on a cocoanut plantation near



LOOKING NORTH FROM WOODED ISLAND

Icaques, where the land has encroached on the sea, this anchor was exhumed many years ago, by a party of laborers, probably from the spot where it was lost. There is the autograph letter of Francisco Roldan which caused the disgrace of Columbus and brought him home in shackles. There are pictures of Columbus in chains; of the chains themselves with the inscriptions thereon; of the citadel and cell at Santo Domingo where he was imprisoned by Bobadilla, and a splinter from the beam to which he was fastened in his dungeon. There is a copy of his famous letter written from Cadiz harbor to the nurse or governess of Prince Juan, in which the great admiral bemoans his fate as one who "has now reached the point where there is no man so vile, but thinks it his right to insult him." Finally is shown his reception by Isabella, of which Oviedo writes: "The queen burst into tears and Columbus fell sobbing at her feet. She took his hands and led him to a seat, and when able to control his emotion, he recited at length the wrongs and humiliations he had suffered in her service. Ample restitution was promised; but there is no evidence that Columbus ever received anything more than sympathy."



MOSAIC WORK IN LA RABIDA

As to his fourth and last voyage there are pictures of all the places which he visited, with others illustrating the popular ideas of the time concerning New World inhabitants. Among them is a view of Santo Domingo, where for his tiny caravels, about the size of fishing-smacks, he asked in vain for shelter from an approaching storm. A photograph shows a street in Trujillo, near the spot where Columbus landed while following the shore line, still in search of a western passage around the world. But now his strength had departed from him, and all that remained was a shattered constitution, a failing intellect, and an iron will. Nevertheless he persisted, exploring the entire coast of the Isthmus until its unbroken barrier mocked at his life-long effort and forced him to abandon a project dearer than life itself.

On the site of Trujillo he had purposed to found a colony; for here were signs of gold; and leaving there his brother Bartholomew with a sufficient force, was about to set sail for Spain, when the embryo settlement was exterminated by Indians and the survivors taken on board the caravels. The Indian huts are reproduced as Columbus found them, as also are the stronghold built by Cortés in 1526 and the chapel erected there in 1540. A scene on the river near Trujillo shows where his men did battle with the natives, and one on the Rio Dulce, in Guatemala, where his vessels went ashore. There are views of Puerto Bello, where a band of his colonists, left to espy whence the Indians gathered their gold, found only a nameless grave. The fight with Porras on the coast of Jamaica and the shipwreck at Christopher's cove are illustrated, and there is the "Lettera Rarissima di Cristoforo Colombo," in which are painfully apparent his broken spirit and his tottering reason. "I was twenty-eight years old," he says, writing to the king from Jamaica, "when I came into your Highness' service, and now I have not a hair upon me that is not gray; my body is infirm, and all that was left to me, as well as to my brother, has been taken away and sold, even to the frock that I wore, to my great dishonor."

Still other sections are devoted to the last days of Columbus, his death and burial, to relics not classified in other divisions, and to the literature of the discovery. Engraved on copper, in 1580, is a view of the city of Seville, with the admiral's house and a cross made of New World gold. There is the convent of Cartuja, where returning from his final voyage he sojourned for a season with Father Corricio, spending his time in bemoaning his misfortunes and writing incoherent letters. A fac-simile of an autograph page from his *De las*

Profecias, the manuscript of which is in the Columbian library at Seville, belongs to an unpublished work attempting to prove that his discoveries were prophesied in holy writ.

But let us turn aside from these last sad days, these mournful evidences of "a mind diseased;" for now his end was near. Of the death of Columbus at Valladolid, and the house in which he died, there are copies of pictures by Ortego, Robert Fleury, Carlos Lira, and others, one of them a large oil painting hung in the corridor. Here is shown the building, at that time used as an inn, where on the 20th of May, 1506, he breathed his last, with none at his bedside, so far as is known, save for his brother Bartholomew. It is a plain unpretentious structure, still almost intact, and over its doorway hung, until recent years, a sign announcing the sale of Leche de burros y vacas—that is to say, of cows' and asses' milk. As to this event the chroniclers of the age are singularly reticent; nor was there even official record, until on the back of one of his appeals to the king, received many days after his decease, was endorsed by a clerk the simple legend: "The within admiral is dead." Thus unhonored passed away the man whom all mankind has honored, and never more so than on this the fourth hundredth celebration of the greatest achievement recorded on history's page.

In graphic art are reproduced the chapel of the convent at Cartuja, where his remains were laid at rest, the cathedrals of Santo Domingo and Havana to which they were removed, and in fac-simile are his leaden coffin and its enclosing urn. There are photographs of his bones and portions of his dust, the latter in locket and crystal case. Of his brothers, his son Diego, and certain of his descendants, including the present duke of Veragua, there are autographs and portraits, and prepared by the duke himself, whose parentage and ancestry are freely represented in pictorial form, is a diagram tracing the lineage of Columbus down to the present day.

Among the Columbian relics contained in a special section are copies of several of his formal, autograph letters and documents, of which more than sixty are still preserved; for Columbus was a voluminous writer, and as the court jester of Charles V remarked, "He and Ptolemy the geographer were twins in the art of



IN THE VATICAN COLLECTION

blotting." His coat-of-arms is shown, with the original decree which granted it, a photograph of his breviary, or of what is supposed to have been his, and some of the actual coins, of which about a score are still in existence, fashioned, as is said, from the gold which he brought with him from Española. There is a photograph of the votive offerings which he left on the shrine of the virgin at Siena in northern Italy, and as a loan from the national museum at Washington is one of the bolts to which he was chained in his dungeon at Santo Domingo.

As to the literature of the discovery there is here reproduced the title page of a letter published in pamphlet form in 1493, a few months after Columbus' return to Palos. On his homeward voyage he wrote two accounts of the expedition, one of which was rendered and printed in Latin; but this priceless manuscript, after serving its purpose, was probably thrown away as useless; for it has never been found. It was but a tiny pamphlet, without the least attempt at ornament or even an initial letter; yet it passed through several editions the first one containing only eight pages with thirty-four lines to the page. Translated into English the title reads in part as follows: "Letter from Christopher Columbus, to whom our age oweth much, concerning the

islands of India beyond the Ganges, recently discovered, in the search of which he was sent eight months ago under the auspices and at the expense of the most invincible King of the Spains, Ferdinand. Addressed to the noble lord Rafael Sanchez, treasurer of the most serene King, the year one of the pontificate of Alexander VI." Of this edition only three copies are known to exist, one in the British museum, another in the Royal library at Munich, and the third in the Public library at Boston, purchased at public sale in 1890 for the sum of $3,000. Of other editions there are copies in various institutions and a few perhaps in private hands.



ILLUMINATED MANUSCRIPT IN VATICAN COLLECTION

A second description of the voyage and its results was addressed to Luis de Santangel, and of this a copy of the first edition, printed at Barcelona in 1493, and said to have been found in Spain in 1889, was secured by the Lenox library of New York. The printed matter, which is in black-faced type, is contained on two leaves of the coarsest of paper, and to these others have been stitched, preserving the copy in good condition after four centuries of time. On one of the outer pages is a brief biography in manuscript of Saint Leocadia, one of the martyrs put to death at Toledo in the year 304.

Of the second voyage a narrative is shown in a ten page Latin pamphlet printed at Pavia in 1494, of which only two copies are known to be extant. As a loan from the congressional library is one of the three existing copies of a sermon of Bishop Carvajal delivered and published in 1493, in which, passing in review the reign of Ferdinand and Isabella, he places first among its achievements the discovery of the western world. A photographic copy shows the famous bull of demarcation issued in May of the same year by Alexander VI. Another contribution from the library of congress is the first drama relating to America, published in 1494. One of the treasures of the collection is the original of the Da Vinci map, showing as islands Florida and Newfoundland, with an imaginary passage westward to the ocean north of the coast line of South America. This is from the library of Queen Victoria, while from the Spanish government is the original of Juan de la Cosa's chart of the West Indies drawn on an ox hide in 1500.

In a modern reprint is the Guiliano Dati poem, a metrical translation of the Santangel letter by the bishop of Saint Leone, and in the sorriest of doggerel. Among other works are *Cosmographiæ* by Peter Apianus, a life of Columbus by his son Fernando, a history of the voyage of Magellan, the first three English books on America, a translation of the log book of Columbus, and one of the first sketches of his life, bearing date



SOUTHEAST END OF THE WOODED ISLAND

1516. Of his first portrait there is a wood-cut from the original painting in possession of the bishop of Norica, and there is a rude wood-cut showing the natives of the West Indies preparing for a cannibal feast, this being the first pictorial illustration whose theme is the aborigines of America.

In two chambers of the upper cloister is a collection of pictures and books relating to what is termed the christening of the continent, showing how America received its name. Another section is devoted to the

conquests of Mexico and Peru, and still others to the original papers of or pertaining to Columbus, including his commission from the crown, with many of his letters and those from the sovereigns of Spain and Portugal. Finally there is the vatican exhibit and a contribution from John Boyd Thacher relating to the discoverer and his discovery. In the former is a picture of "St Peter Weeping," after Guido Reni's masterpiece, the execution of which was a six years' labor of love. Others have for their subject "The Prophet Isaiah," "The Roman Forum," and "Theology," the last a copy, is from Raphael. The pope is shown in the act of blessing the people,



SECTIONAL VIEW OF THE FAIR

and by Chatrau is a portrait of Leo XIII, as a token of his interest in this department of the Exposition. There is the Borgian map of America by Ribero, finished in 1529 presumably for Charles V. To the same date belongs the Ribero vellum chart of the old and new world. There are also several letters and bulls from the chief pontiffs, the oldest of them being from Nicolas V, an epistle of the 20th of September, 1448, and relating to the condition of the church in Greenland.

World's Fair Miscellany.—To William E. Curtis, chief of the Latin-American bureau, I am indebted for a valuable dictation on the monastery of La Rabida and its contents.

The ruins of Yucatan, discovered several years ago by E. H. Thompson, resident consul at Merida, were partially reproduced, as I have said, to the north of the Anthropological building, with a mechanical imitation of tropical verdure. For the latter purpose a pulp mixed with vegetable fibre was used, the base of which was a thick, tough paper, and this was hammered into every crevice of wall or sculptured figure. Seventeen months were thus spent by the consul and his Indian assistants before the casts were ready to be shipped to Chicago, and reproduced in staff. The ruined city of Uxmal, from which the most interesting sections of architecture were copied, is situated in the southeastern portion of Yucatan, more than 100 miles inland. Perhaps the most striking feature in this collection was the façade of the temple which showed the figure of the great feathered serpent, the ancient god Kukulkan.

Immediately west of the Anthropological building, in what appears to be a massive cliff of reddish brown, is represented Battle Rock mountain, a weird and solitary landmark of the desert of southwestern Colorado. Here are the so-called Cliff palace, Balcony house, and other abodes once inhabited by the cliff-dwellers. A museum shows in fac-simile their pottery, weapons, implements, ornaments, clothing, and mummies, as found by exploring parties. There is also a cave filled with oil paintings reproducing other features in these prehistoric settlements, while at the base of the hill outside are small herds of deer, mountain sheep, and burros, browsing on sage-brush and yucca as in their native country.

Among rare archæological specimens are the hand of Buddha, webbed up to the middle joints of the fingers, and the fragment of a temple frieze, found a few years ago by an officer in the British army, in the northern portion of India. Portions of other friezes have been discovered in the same locality and deposited in the British museum; but the figures upon them represent war, hunting, or athletic sports.

The central figure of the fragment here exhibited is that of Buddha holding in his hand the sacred lotus. A statue of Demosthenes, also reproduced in this department, was discovered in the country between the Swat and the Indus. It is supposed that the sculptor accompanied Alexander the great on his campaign into this part of Asia, and the work would thus bear date about 330 B.C.

What is claimed to be the largest piece of lapis lazuli in the world was displayed in the Anthropological building. It was found in one of Bolivia's ancient tombs, is of beautiful color, and 30 by 18 inches in dimensions.

On the eastern shore of the south pond are groups of huts which, with their inmates, form a most interesting exhibit in the ethnological department. In the largest cluster is illustrated the daily life of the British Columbian and Alaskan Indians, their hideous totem poles standing in front of their village. Some of the poles supported the roof beams, and have carvings upon them of tribal significance. On one of the front posts of a hut occupied by the Nanaimo Indians, of Vancouver island, is the spirit of the sea called Squa-eque, and upon the rear post, a figure explained as "a man holding a goose." Another heraldic column has a raven upon its upper portion, and below, the spirit of the sea, whose open mouth forms the doorway. Through the legs of grizzly bears the visitor passes into other dwellings. The mythical thunder bird is perched over the door of the structure occupied by the Kuakiutl Indians, and on either side is a painting of the sun. Upon the totem poles of the Haidas and some of the Alaskan tribes are gigantic figures of sparrow hawk, wolf, eagle, bear, and frog. Moored to the shores of the pond are two long canoes, such as the Indians of Vancouver use on their hunting or fishing excursions. In all the totem-pole villages are Indians and their families, living as they do at home. Near by are represented, in a reproduction of the council-house of the Iroquois, the historic six nations of New York. The building is of bark, and in rear of it is the typical stockade. Within are chiefs of the Senecas and Onondagas, the latter being the keeper of the ancient council fire. There are also the wampum keeper of the allied tribes; their grand sachem, Colonel Eli S. Parker, one of General Grant's officers; a descendant of the famous chief, Cornplanter, and a proud looking little red man, well along in years, who claimed to be in his day the champion runner of the world, having made a wonderful record before the prince of Wales about a half a century ago. Accompanying these notables of the male sex are several well-favored women, attending to household duties or offering for sale the products of their labor and skill.

Near the council-house of the Iroquois are several teepees of birch bark, in which live about a dozen Penobscot Indians, a remnant of a once powerful tribe, now reduced to a few hundred members, living on Indian island, or at Old Town, on the Penobscot river. The Crows have also a lodge of skins, colored with red and yellow ochre, and five Navajoes occupy a log hut covered with sod.

North of this ethnological exhibit, organized as an illustration of the primitive life of the aborigines, is shown the reverse side of the picture. During the term of the Fair, Indian boys and girls whom the government was educating at different institutions in New Mexico, Kansas, Indiana, and Pennsylvania, were sent to the model school of the Exposition. Of these and the attendant exhibits mention has been made in the chapter devoted to the government exhibits.

In the Anthropological building, one of the assistants in the office of the chief of department was a tall, sinewy, finely-featured, full-blooded Apache named Antonio. He was born somewhere in the Sierra Madre mountains, Arizona, and when a child was captured during the government campaigns of 1877 against the famous chieftains Geronimo and Cochise, of whom he is a relative. Taken to Fortress Monroe, he afterward went to Europe on a yacht, becoming proficient in various trades and receiving his education at the night schools of New York and Boston. During the preliminary work of the department, Antonio met his employer at the Peabody museum, and was sent among the Navajoes and Apaches to collect exhibits. At last accounts, Antonio's ambition was to visit the Antwerp exposition, as the employé of some American exhibitor, and eventually to complete his education at Harvard university.



ANTONIO APACHE





LANDING BEFORE THE ART PALACE

